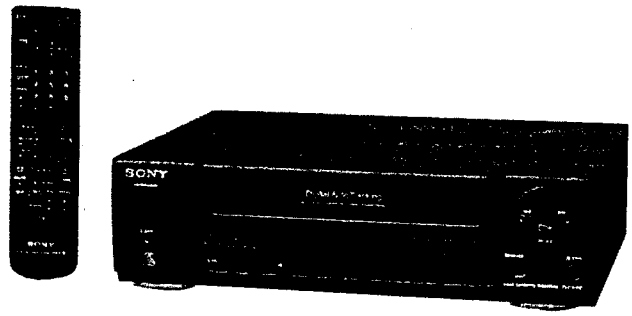
SLV-E150EE
SLV-X312ME/PS/SG
RMT-V153B

SERVICE MANUAL

East European Model
SLV-E150EE
E Model
SLV-X312PS
ME Model
SLV-X312ME/SG



- **Refer to the SERVICE MANUAL of VHS MECHANICAL ADJUSTMENTS IV for MECHANICAL ADJUSTMENTS. (9-973-623-11)**

Photo: SLV-X312PS

VHS PAL NTSC 4.43

SPECIFICATIONS

System

Channel coverage
SLV-E150EE:
VHF R1 – R12, E2 – E12
UHF E21 – E69
CATV S01 – S05, S1 – S41
SLV-X312ME, SLV-X312PS, SLV-X312SG:
VHF E2 – E12
UHF E21 – E69
CATV S01 – S05, S1 – S41

RF output signal
UHF channels 30 – 39

Aerial out
75-ohm asymmetrical aerial socket

Inputs and outputs

LINE IN
VIDEO IN, Phono jack (1)
Input signal: 1 Vp-p, 75 ohms, unbalanced, sync negative
AUDIO IN, Phono jack (1)
Input level: –7.5 dBs (0 dBs = 0.775 Vrms)
Input impedance: more than 47 kilohms

LINE OUT
VIDEO OUT, Phono jack (1)
Output signal: 1 Vp-p, 75 ohms, unbalanced, sync negative
AUDIO OUT, Phono jack (1)
Output level: –7.5 dBs (0 dBs = 0.775 Vrms)
Output impedance: less than 10 kilohms

General

Power requirements
SLV-E150EE:
220 – 240 V AC, 50 Hz
SLV-X312ME, SLV-X312PS, SLV-X312SG:
110 – 240 V AC, 50/60 Hz

Power consumption
19 W

Operating temperature
5°C to 40°C

Storage temperature
– 20°C to 60°C

Dimensions
Approx. 355 x 100 x 277 mm (w/h/d)
including projecting parts and controls

Weight
Approx. 4.2 kg

Supplied accessories

Remote commander (1)
R6 (size AA) batteries (2)
Aerial cable (1)
Mains lead (1)
Plug adaptor (1)
(SLV-X312ME/X312SG only)

Design and specifications are subject to change without notice.

MICROFILM

VIDEO CASSETTE RECORDER
SONY

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SERVICE NOTE

1. DO NOT LIFT UP BY HOLDING FL TOP PLATE AS SHOWN BELOW.

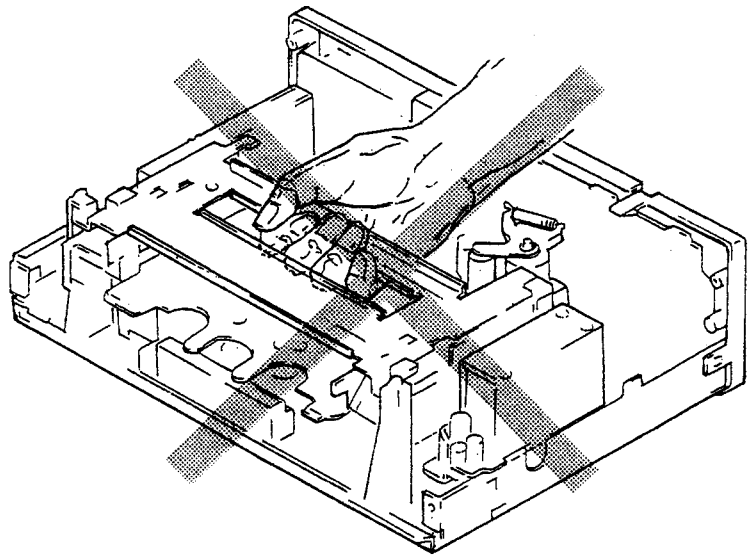


Fig. 1

2. DRUM ASSEMBLY REMOVAL

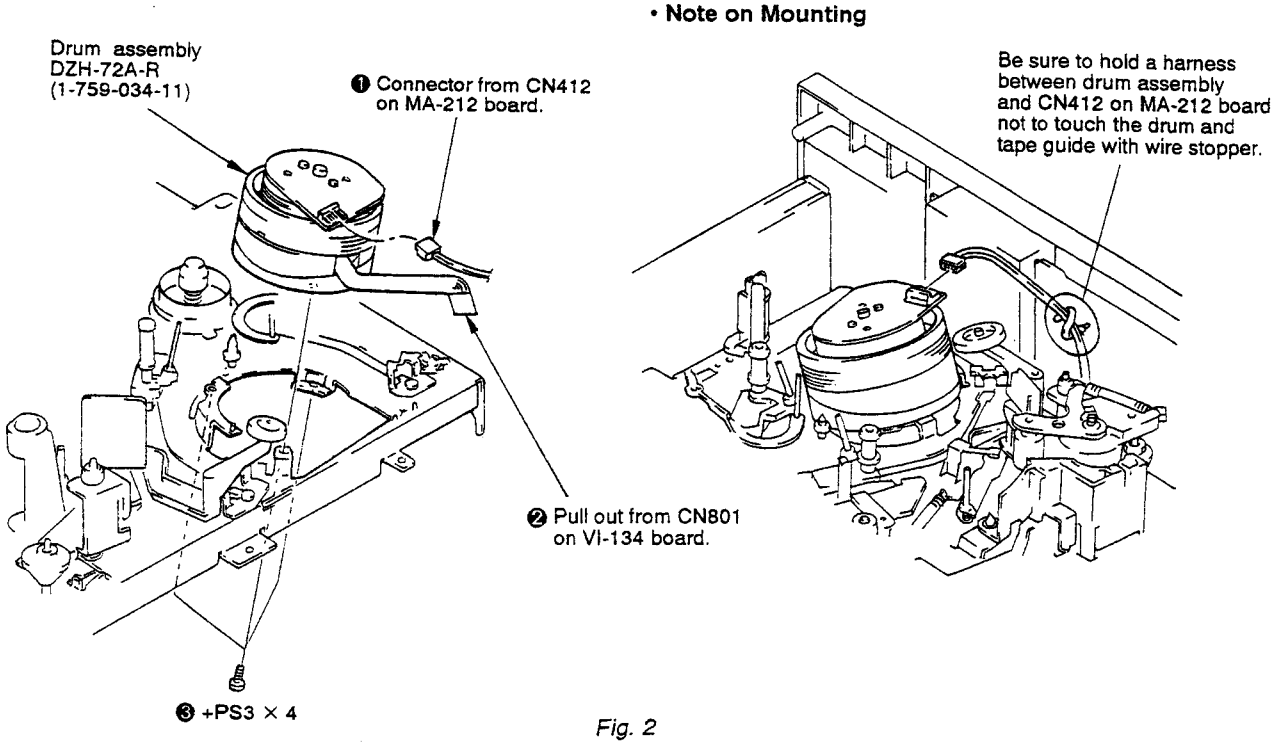


Fig. 2

OPC (OPTIMUM PICTURE CONTROL) CIRCUIT

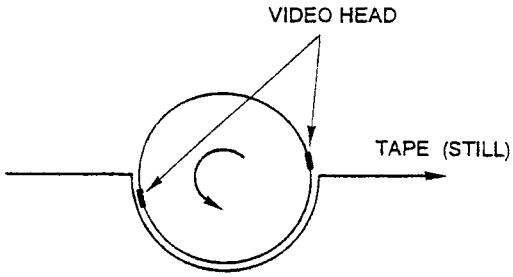
1. GENERAL

The magnetic characteristics of tape depend upon the kind of the tape (e. g. standard tape, high grade tape, etc.), so the quality of playback signal varies even at the same recording current.
OPC is used to improve the quality of playback picture by setting automatically the recording current suitable for the characteristics of tape during recording and by changing the characteristics of circuit automatically according to PB RF signal level during playback.

		REC	PB
SLV-X312	OPC	×	○
SLV-E150EE	TRILOGIC OPC	○	○

2. RECORD MODE

2-1. ALGORITHM OF MEASUREMENT OF OPTIMUM RECORDING CURRENT



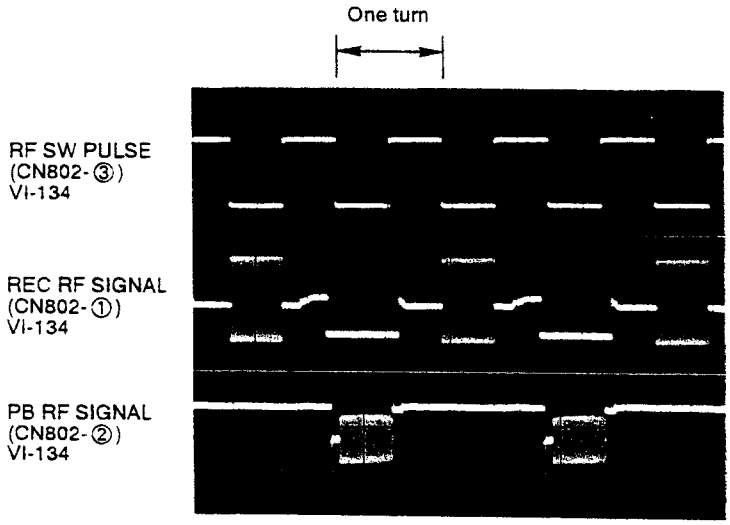
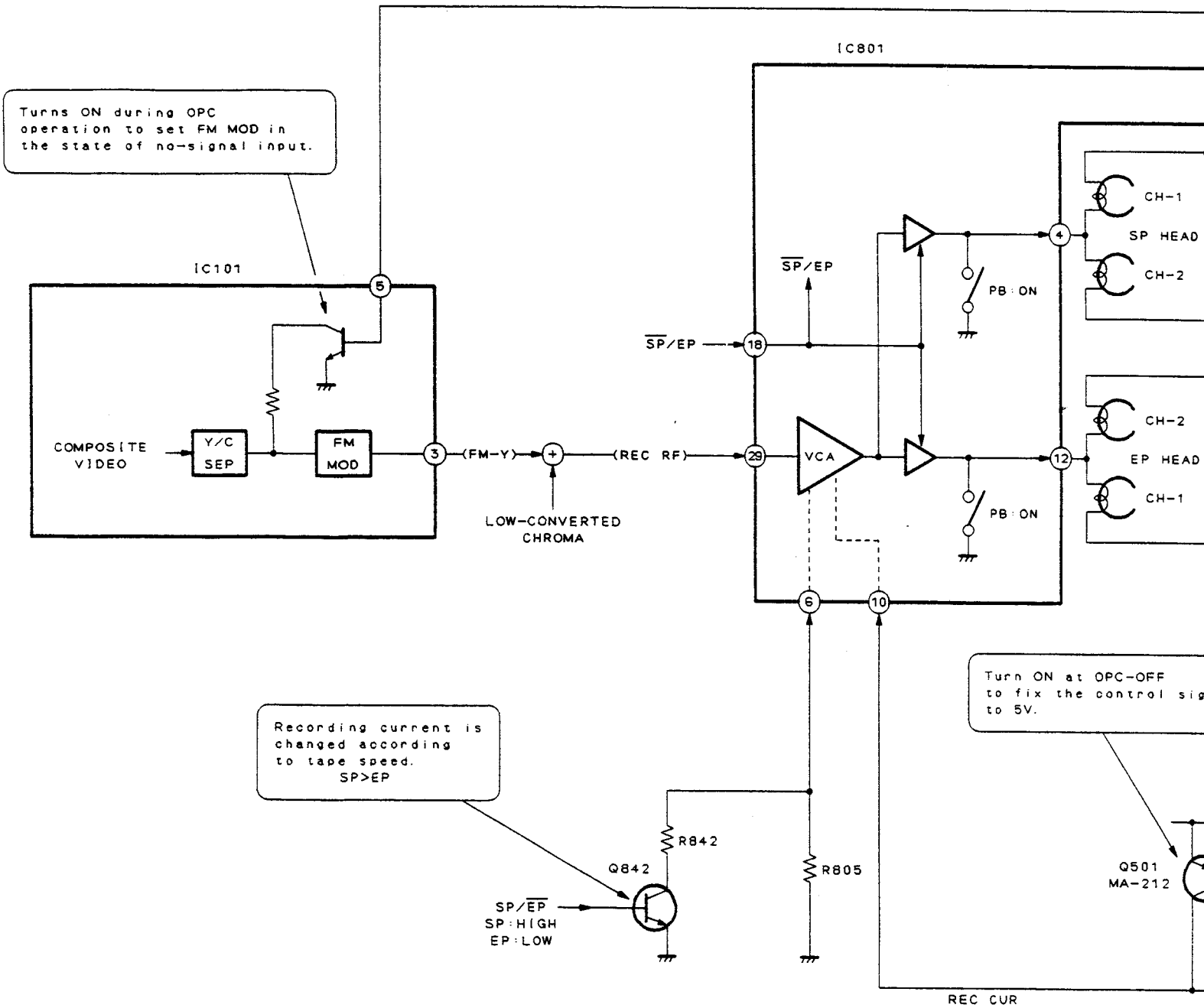
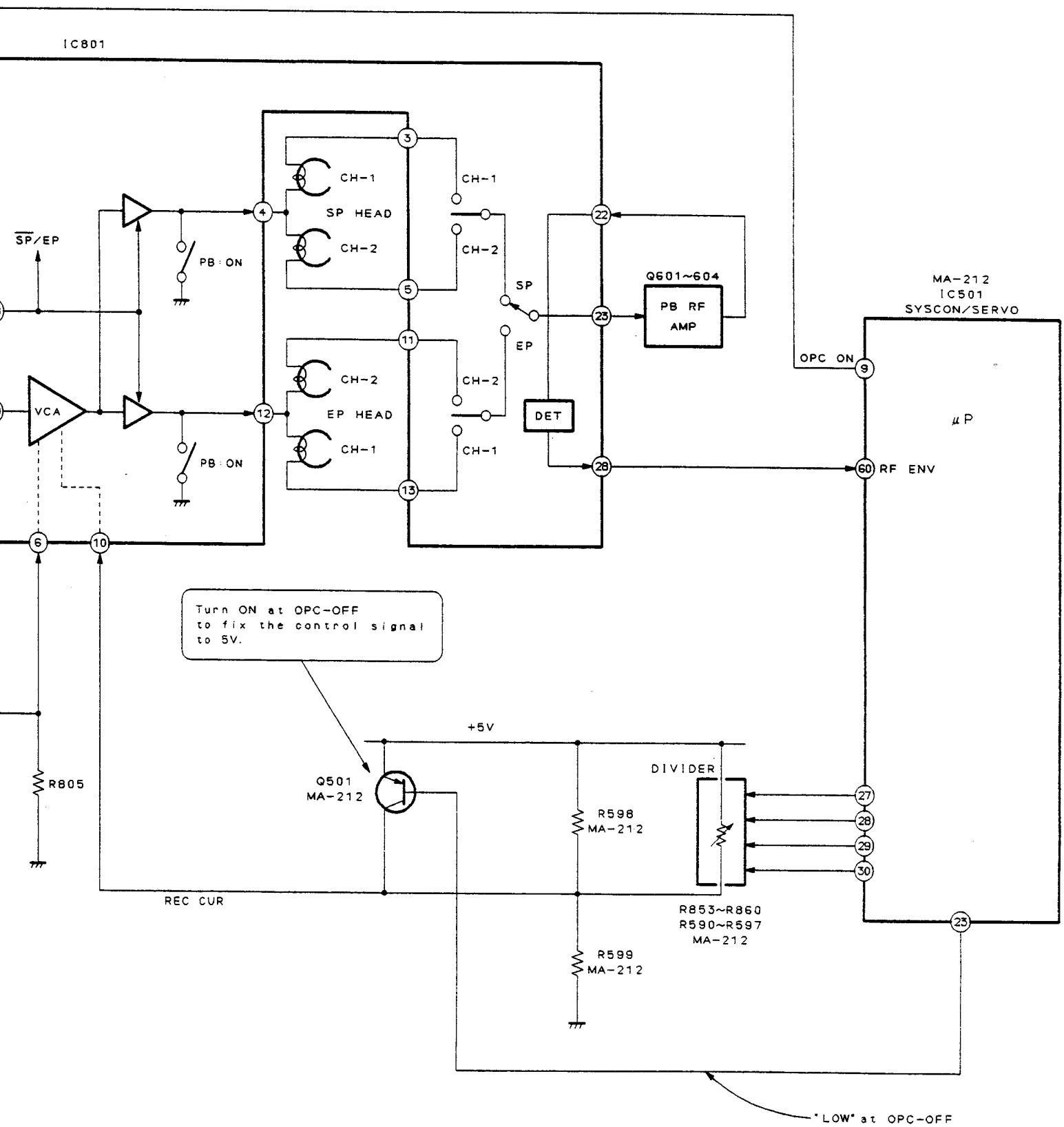


Fig. 3

1. Record the signal in the stop mode of tape.
2. Play the recorded signal with the same head, and measure the output signal level.
3. Next, change the recording current and measure the output signal level.
4. Repeat the above operation. The recording current, at which a maximum output signal level is measured, is optimum recording current.
5. Optimum recording current can be set quickly, because tape is not running (overlap recording is repeated).

2-2. OPC OPERATION DURING RECORDING




IC801
SP/EP
PB : ON
VCA
PB : ON
CH-1
SP HEAD
CH-2
CH-2
EP HEAD
CH-1
CH-1
CH-2
SP
EP
DET
Q601~604
PB RF
AMP
MA-212
IC501
SYSCON/SERVO
OPC ON
μP
RF ENV
Turn ON at OPC-OFF
to fix the control signal
to 5V.
+5V
R805
Q501
MA-212
R598
MA-212
DIVIDER
REC CUR
R853~R860
R590~R597
MA-212
R599
MA-212
"LOW" at OPC-OFF

2-3. OPERATION FLOW

1. When a cassette is inserted, it is automatically loaded while the tape is threaded.
   Under this condition, the unit is ready to accept a function input (the drum motor keeps running). When the function input is absent for about 5 minutes, the drum motor stops running and the unit is set in stop mode.
2. If the OPC indicating lamp is OFF, it should be turned ON.
3. Press the REC button.
4. The CAM motor starts running and the mechanism is set in FWD mode, but the capstan motor should be left in stop mode.
5. The divider is driven by IC501 to change the gain control signal of VCA (Voltage Controlled Amplifier).

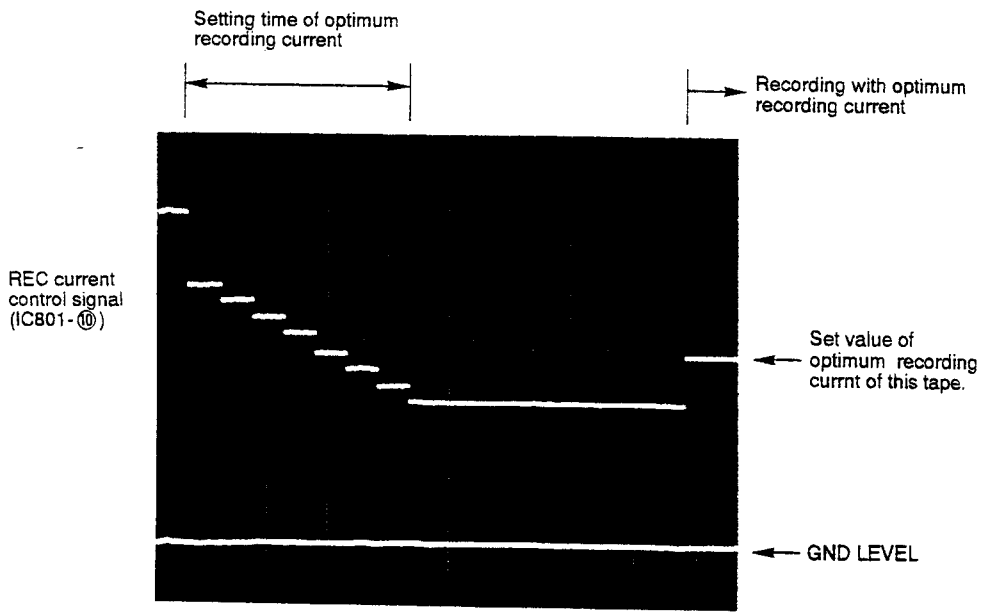

Setting time of optimum recording current
Recording with optimum recording current
REC current control signal (IC801-⑩)
Set value of optimum recording currnt of this tape.
GND LEVEL
V: 1V/div
H: 0.5sec/div

Fig. 4

[Measurement of

The recording curre
current.

6. Using the abov

   The above com

7. Rewind the tap
8. Start recording

Note: When the OP
(Item 7) with

[Measurement of output level]

the function

The recording current varies with changes in the control signal. Measure the playback output level at change of recording current.

e left in stop

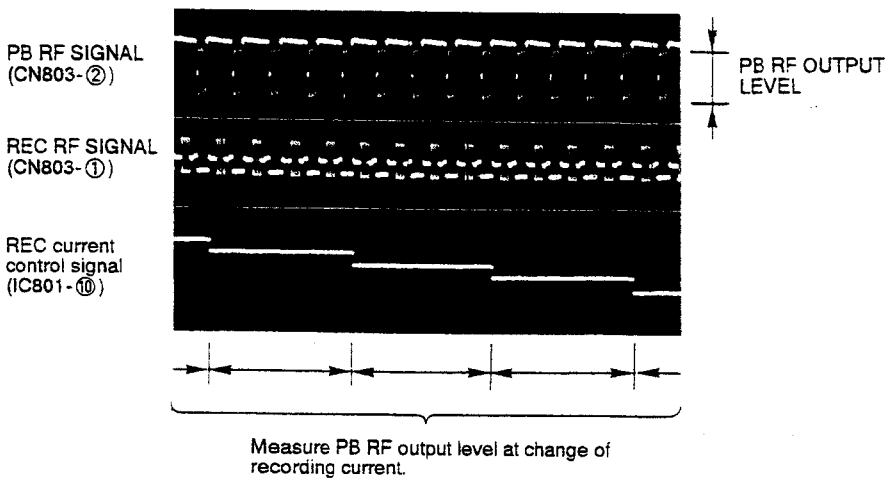


Fig. 5

6. Using the above procedure, obtain an optimum recording current for maximum PB RF signal level.

   The above completes the setting of optimum recording current.

7. Rewind the tape slightly.
8. Start recording.

Note: When the OPC lamp on the fluorescent display window is OFF, press the REC button. Then, the unit starts recording (Item 7) without the above operation (Items 4 through 6).

3. PLAYBACK MODE

3-1. OPC OPERATION DURING PLAYBACK

1) The circuit characteristic is selected by the PB RF signal level.

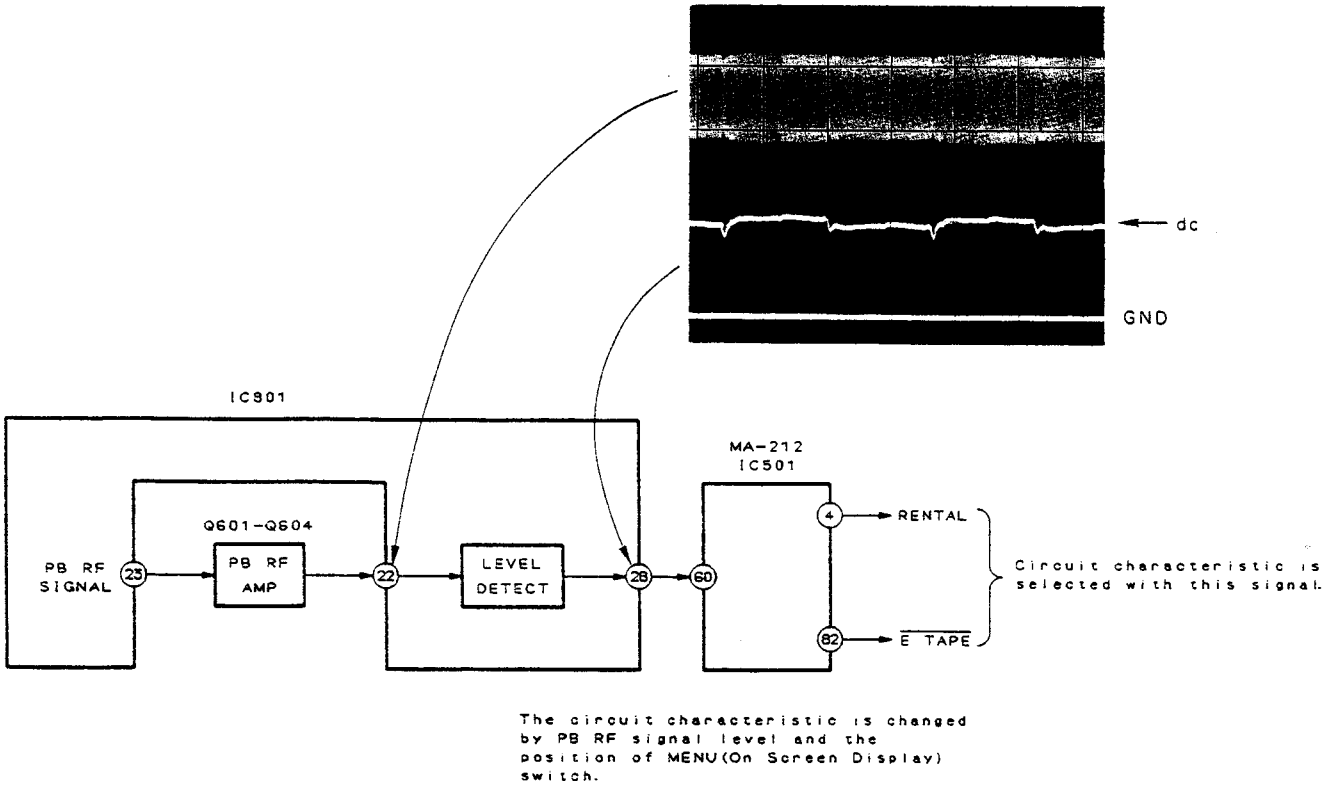


Fig. 6

2) PB RF signal level and select signal.

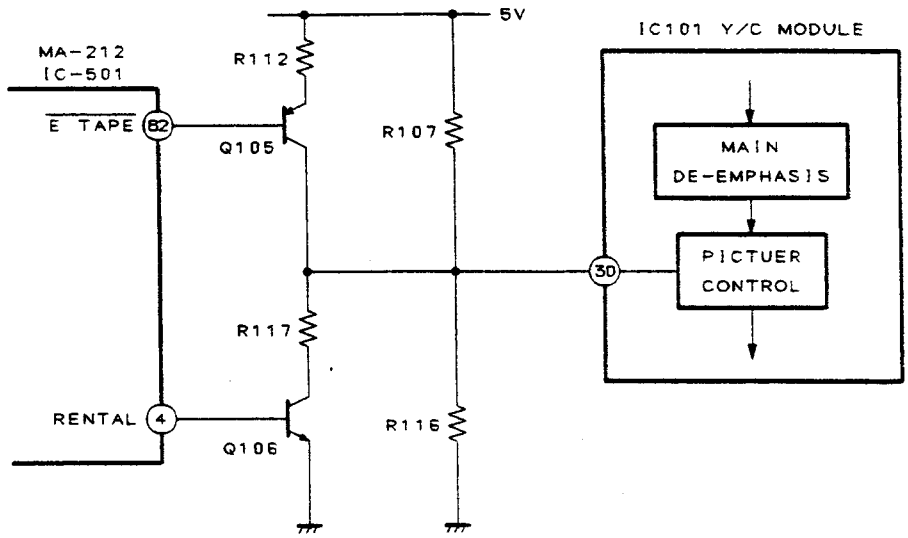
- Set "OPC ON"+"RENTAL OFF" on the SET UP MENU screen

Select signal \ PB RF level	High	Medium	Low
$\overline{\text{E TAPE}}$	L	H	H
RENTAL	L	L	H

- Set "OPC ON"+"RENTAL ON" on the SET UP MENU screen

Select signal \ PB RF level	High	Medium	Low
$\overline{\text{E TAPE}}$	H	H	H
RENTAL	H	H	H

3) Select signal and circuit characteristic.

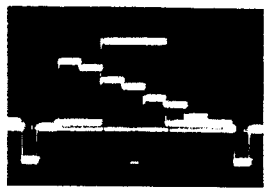


Picture characteristic is operated by PICTURE CONTROL circuit which is controlled by DC level.

3-2. CHANGE OF CIRCUIT CHARACTERISTIC, AND WAVEFORM

SP mode, self-REC/PB, OPC REC/PB: ON

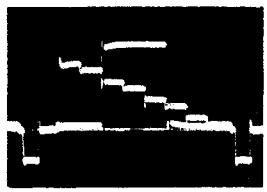
REC signal



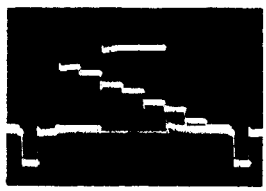
Note : Waveform measured at VIDEO LINE OUT terminal

PB mode

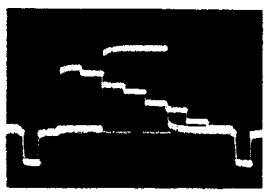
- OPC ON



$\overline{\text{E TAPE}}$ ···· LOW
RENTAL ··· LOW

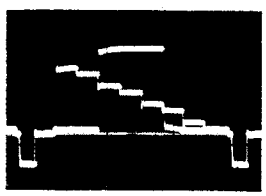


$\overline{\text{E TAPE}}$ ···· HIGH
RENTAL ··· LOW



$\overline{\text{E TAPE}}$ ···· HIGH
RENTAL ··· HIGH

- RENTAL ON

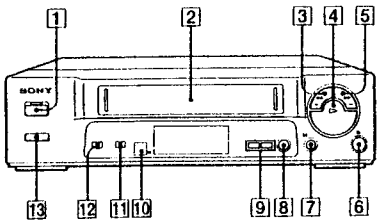


$\overline{\text{E TAPE}}$ ···· HIGH
RENTAL ··· HIGH

Index to parts and controls

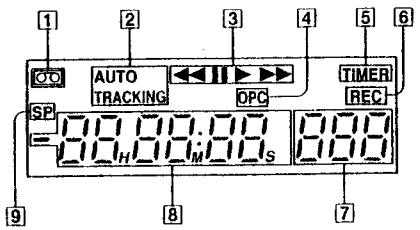
Refer to the pages indicated in ( ) for details.

Front panel



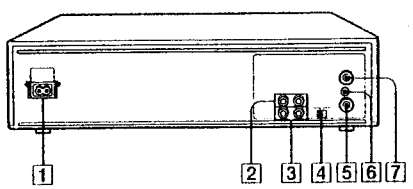
[1] ON/STANDBY switch/indicator
[2] Cassette compartment
[3] ◀◀ REW (rewind) button (25)
[4] ▷ PLAY button (25)
[5] ▶▶ FF (fast-forward) button
[6] ■ STOP button
[7] ❚❚ PAUSE button (29)
[8] ● REC button (29)
[9] PROGRAM +/– buttons
[10] Remote sensor (6)
[11] NTSC PB switch (16)
[12] COLOR SYSTEM switch (16)
[13] ⏏ EJECT button

Display window



[1] Tape indicator
[2] AUTO TRACKING indicator (26)
[3] Tape operation indicators
[4] OPC (Optimum Picture Control) indicator (26)
[5] TIMER indicator (18, 21)
[6] REC (recording) indicator
[7] Line/programme position indicator
[8] Time counter/clock (16)
[9] Tape speed indicator (18)

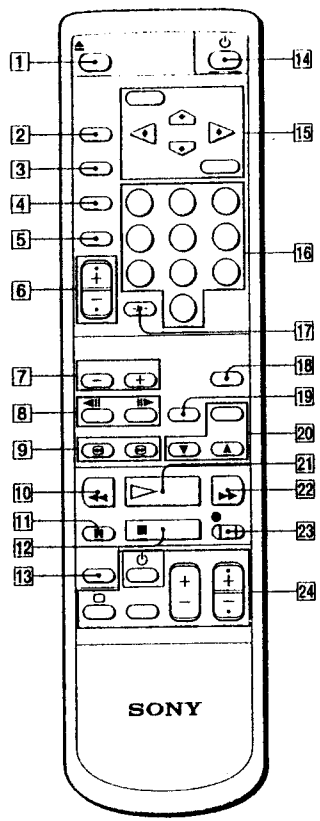
Rear panel



[1] AC IN connector (7)
[2] LINE IN AUDIO/VIDEO jacks (28)
[3] LINE OUT AUDIO/VIDEO jacks (7, 28)
[4] TV SYSTEM switch (9)
[5] AERIAL OUT connector (7)
[6] RF CHANNEL screw (9)
[7] AERIAL IN connector (7)

Index to parts and controls (continued)

Remote commander



[1] ⏏ EJECT button (15)
[2] TIMER CLEAR button (23)
[3] QUICK TIMER button (18)
[4] DISPLAY button (16)
[5] COUNTER RESET button (16)
[6] PROG (programme) +/– button (8)
[7] ▮▶ SLOW buttons (25)
[8] ◀▮/▮▶ FRAME buttons (25)
[9] ⏪/⏩ SEARCH buttons (15)
[10] REW ◀◀ (rewind) button (15, 25)
[11] ❚❚ PAUSE button (15)
[12] ■ STOP button (15)
[13] SKIP button (25)
[14] ⏻ (on/standby) button (8)
[15] MENU operation buttons (10)
MENU button
CURSOR buttons (△/▽/◁/▷)
EXECUTE button
[16] Programme number buttons (11)
[17] -/-- (ten's digit) button (11)
[18] INPUT SELECT button (8)
[19] × 2 (double speed) button (25)
[20] TRACKING buttons
AUTO/MAN (manual) button (26)
▼/▲ NORMAL/SLOW STILL ADJUST buttons (25, 26)
[21] ▷ PLAY button (15)
[22] FF ▶▶ (fast-forward) button (15, 25)
[23] ● REC (recording) button (17)
[24] TV control buttons (6)
▢ (power on) button
⏻ (on/standby) button
TV/VIDEO button
VOL (volume) +/– button
PROG (programme) +/– button

SECTION 1
GENERAL

This section is extracted from instruction manual.

SLV-E150EE
SLV-X312ME/PS/SG

Welcome!

Thank you for purchasing the Sony Video Cassette Recorder (VCR). Here are some of the features you'll enjoy with your VCR:

- Optimum Picture Control (OPC) that automatically optimises recording and playback performance *(SLV-E150EE)*
- Optimum Picture Control (OPC) that automatically optimises playback performance *(SLV-X312ME/X312PS/X312SG)*
- Dynamic Signal Filter (DSF) that boosts and stabilises signals

Compatible colour systems

- This VCR is designed to record and play back using the PAL and MESECAM colour systems (system B/G and D/K). Recording of video sources based on other colour systems cannot be guaranteed.
- Tapes recorded with the NTSC colour system can be played back on this VCR using a TV or a colour monitor for the PAL colour system.

Checking your model name

The instructions in this manual are for the SLV-E150EE/SLV-X312ME/SLV-X312PS/SLV-X312SG. Check your model number by looking at the rear panel of your VCR. The SLV-X312PS is the model used for illustration purposes. Any difference in operation is clearly indicated in the text, for example, *"SLV-X312SG only."*

Precautions

Safety

- Check that the unit's operating voltage is identical with your local power supply.

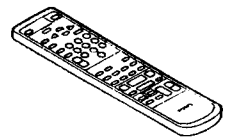
Model number	Operating voltage
SLV-E150EE	220 – 240 V AC, 50 Hz
SLV-X312ME	110 – 240 V AC, 50/60 Hz
SLV-X312PS	110 – 240 V AC, 50/60 Hz
SLV-X312SG	110 – 240 V AC, 50/60 Hz

- If anything falls into the cabinet, unplug the unit and have it checked by qualified personnel before operating it any further.
- The unit is not disconnected from the mains as long as it is connected to the mains outlet, even if the unit itself has been turned off.
- Unplug the unit from the wall outlet if you do not intend to use it for an extended period of time. To disconnect the cord, pull it out by the plug, never by the cord.

Step 1 Unpacking

Check that you have the following items:

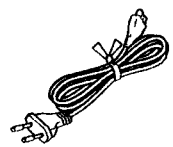
- **Remote commander**



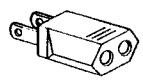
- **R6 (size AA) batteries**

- **Aerial cable**

- **Mains lead**



- **Plug adaptor (*SLV-X312ME/X312SG only*)**

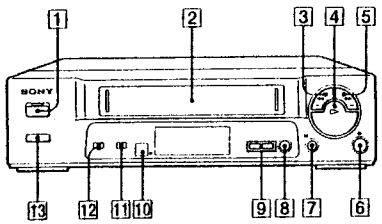


This section is extracted from instruction manual.

Index to parts and controls

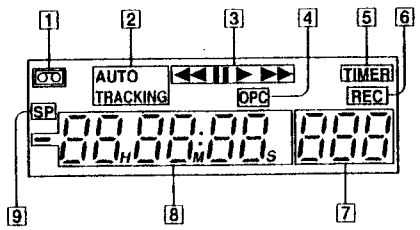
Refer to the pages indicated in ( ) for details.

Front panel



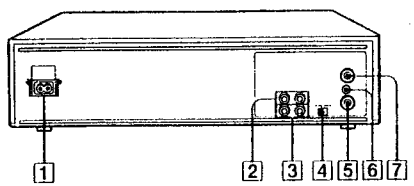
1 ON/STANDBY switch/indicator
2 Cassette compartment
3 ◀◀ REW (rewind) button (25)
4 ▷ PLAY button (25)
5 ▶▶ FF (fast-forward) button
6 ■ STOP button
7 ❚❚ PAUSE button (29)
8 ● REC button (29)
9 PROGRAM +/– buttons
10 Remote sensor (6)
11 NTSC PB switch (16)
12 COLOR SYSTEM switch (16)
13 ⏏ EJECT button

Display window



1 Tape indicator
2 AUTO TRACKING indicator (26)
3 Tape operation indicators
4 OPC (Optimum Picture Control) indicator (26)
5 TIMER indicator (18, 21)
6 REC (recording) indicator
7 Line/programme position indicator
8 Time counter/clock (16)
9 Tape speed indicator (18)

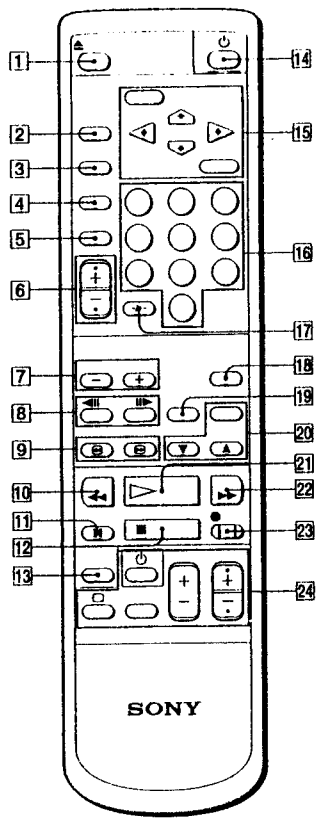
Rear panel



1 AC IN connector (7)
2 LINE IN AUDIO/VIDEO jacks (28)
3 LINE OUT AUDIO/VIDEO jacks (7, 28)
4 TV SYSTEM switch (9)
5 AERIAL OUT connector (7)
6 RF CHANNEL screw (9)
7 AERIAL IN connector (7)

Index to parts and controls (continued)

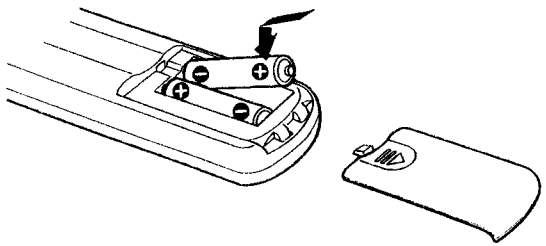
Remote commander



1 ⏏ EJECT button (15)
2 TIMER CLEAR button (23)
3 QUICK TIMER button (18)
4 DISPLAY button (16)
5 COUNTER RESET button (16)
6 PROG (programme) +/– button (8)
7 ▮▶ SLOW buttons (25)
8 ◀❚❚/❚❚▶ FRAME buttons (25)
9 ⏮/⏭ SEARCH buttons (15)
10 REW ◀◀ (rewind) button (15, 25)
11 ❚❚ PAUSE button (15)
12 ■ STOP button (15)
13 SKIP button (25)
14 ⏻ (on/standby) button (8)
15 MENU operation buttons (10)
MENU button
CURSOR buttons (△/▽/◁/▷)
EXECUTE button
16 Programme number buttons (11)
17 -/-- (ten's digit) button (11)
18 INPUT SELECT button (8)
19 × 2 (double speed) button (25)
20 TRACKING buttons
AUTO/MAN (manual) button (26)
▼/▲ NORMAL/SLOW STILL ADJUST buttons (25, 26)
21 ▷ PLAY button (15)
22 FF ▶▶ (fast-forward) button (15, 25)
23 ● REC (recording) button (17)
24 TV control buttons (6)
▢ (power on) button
⏻ (on/standby) button
TV/VIDEO button
VOL (volume) +/– button
PROG (programme) +/– button

Step 2 Setting up the remote commander

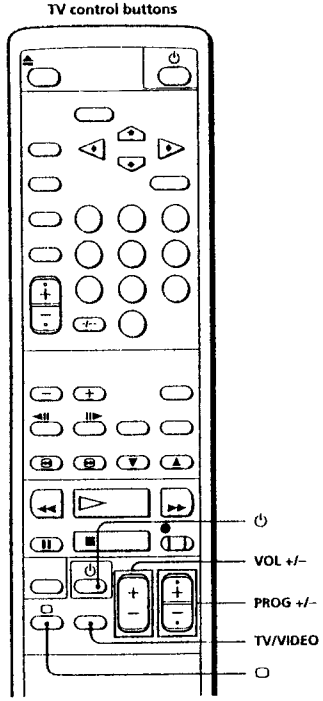
Insert two R6 (size AA) batteries by matching the + and – on the batteries to the diagram inside the battery compartment.



Using the remote commander

You can use this remote commander to operate this VCR and a Sony TV. To operate the VCR, point at the remote sensor on the VCR. To operate the TV, point at the remote sensor on the TV.

TV control buttons



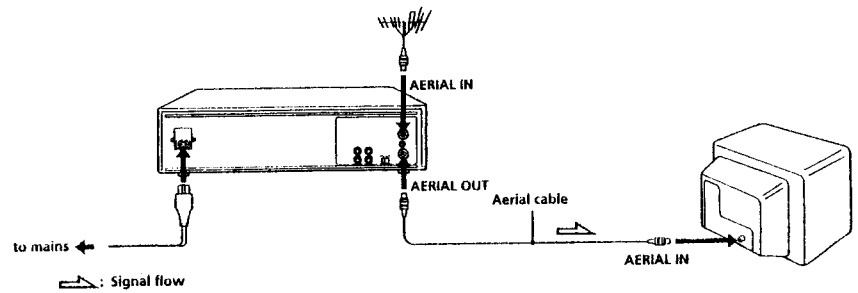
To	Press
Turn the TV into standby or active mode	⏻
Turn the power of the TV on	▢
Increase (+) or decrease (–) the volume of the TV	VOL +/–
Change the programme position of the TV	PROG +/–
Select an input source of the TV either from aerial in or from line in	TV/VIDEO

Notes

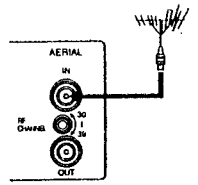
- With normal use, the batteries should last for approximately three to six months.
- If you do not use the remote commander for an extended period of time, remove the batteries to avoid possible damage from battery leakage.
- Do not use a new battery with an old one.
- Do not use different types of batteries.

1-3

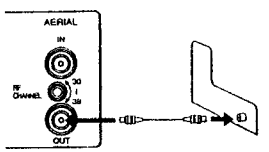
Step 3 Connecting the VCR



1 **Disconnect the aerial input cable from your TV and connect it to AERIAL IN of the VCR.**

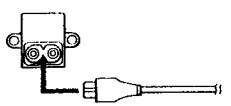


2 **Connect AERIAL OUT of the VCR and the aerial input of your TV using the supplied aerial cable.**



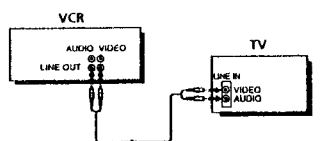
3 **Connect AC IN of the VCR and the mains supply using the mains lead.**

You've completed the basic hookup to watch and record TV programmes.



Additional connection

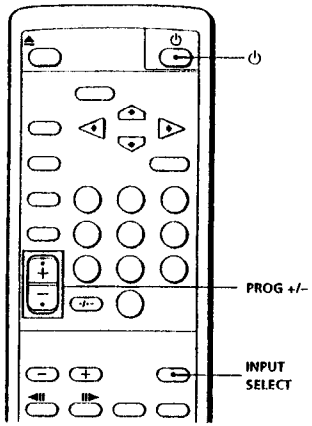
If your TV has phono type audio/video input jacks, this additional connection can improve picture quality. Connect to the TV as shown on the right.



Audio/video cable VMC-710M/720M (not supplied)

Step 4 Tuning the TV to your VCR

If you have connected the VCR to your TV using an audio/video cable, skip this step.



1 ⏻

Press ⏻ (on/standby) to turn on the VCR.

2 INPUT SELECT

Press INPUT SELECT until "L" appears in the display window.

3

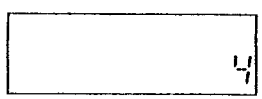
Turn on your TV and select a programme position for video playback. Choose a channel between UHF 30 and 39 on the TV, where there is no picture and no sound or only a steady rustling sound.

4

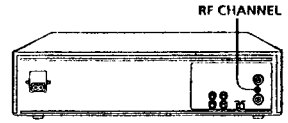
Tune the TV so that a clear blue screen appears on the TV screen.
Refer to your TV manual for tuning instructions.

5 PROG + –

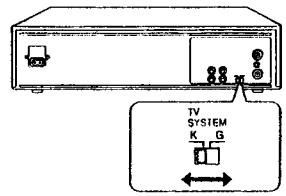
Press PROG +/– to check to see if the TV screen changes to a different programme.
You have now tuned your TV to the VCR.
Whenever you play a tape, set the TV to the programme position selected in step **3** above.



To obtain a clear blue screen
The blue screen may not appear clearly in step **4** above. In this case, turn the RF CHANNEL screw at the rear of the VCR with an RF screwdriver, to a position where the TV clearly displays a blue screen.

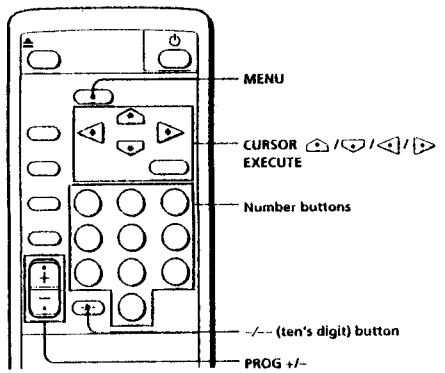


Selecting the TV system
For your TV to receive the correct signal from your VCR, you must set the TV SYSTEM switch at the rear of the VCR to either G (for system B/G) or K (for system D/K). If this switch is set to the wrong position, the sound is distorted.



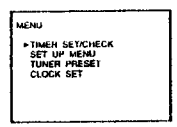
Step 5 Tuning the VCR to TV channels

Now you can set your VCR to receive broadcast channels using the on-screen display.



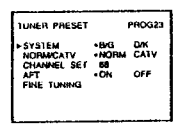
1 MENU

Press MENU.
The following menu appears on the TV screen.



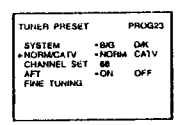
2 CURSOR ▲/▼, EXECUTE

Press the ▲/▼ buttons to move the cursor (▶) to TUNER PRESET, then press EXECUTE.



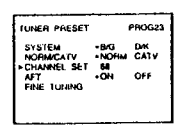
3 CURSOR ▲/▼/◀/▶

Press the ▲/▼/◀/▶ buttons to move the cursor (▶) to NORM/CATV, then move the dot (•) to NORM.
To preset cable TV channels, move the dot (•) to CATV.



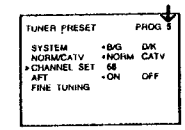
4 CURSOR ▲/▼

Press the ▲/▼ buttons to move the cursor (▶) to CHANNEL SET.



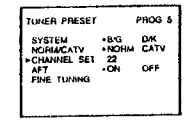
5 PROG +/–

Press PROG +/– to select the programme position.



6 CURSOR ◀/▶

Press ▶ to start turning.
The VCR starts searching for a channel and displays the first one it finds on the TV screen. Press the ◀/▶ buttons repeatedly until the channel you want is displayed. The channels are scanned in the following order:



(SLV-E150EE)

D/K TV system		B/G TV system	
Channel number in the CHANNEL SET field	**CHANNEL**	**Channel number in the CHANNEL SET field**	**CHANNEL**
2	R1	1	NZ1
5	R6	2	E2
6	R7	3	E3
12	R12	4	E4
13	R2	5	E5
14	R3	6	E6
15	R4	7	E7
16	R5	8	E8
17	R8	9	E9
18	R9	10	E10
19	R10	11	E11
20	R11	12	E12
21-69	R21-R69	21-69	E21-E69
		CATV 1-41	S1-S41
		CATV 42-46	S01-S05

(SLV-X312ME/X312PS/X312SG)

Channel number in the CHANNEL SET field	CHANNEL
2-12	VHF 2-12
21-69	UHF 21-69
CATV 1-41	S1-41
CATV 42-46	S01-05

If you know the number of the channel you want, press the number buttons. For two-digit numbers, press the -/-- (ten's digit) button followed by the number buttons.

7 CURSOR ▲/▼/◀/▶

If the TV sound is distorted or noisy, press the ▲/▼/◀/▶ buttons to move the cursor (▶) to SYSTEM, then move the dot (•) to either B/G or D/K, whichever is applicable in your area.

8

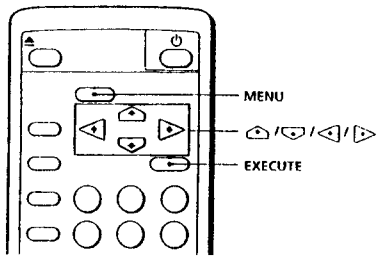
To allocate another channel to another programme position, repeat steps 5 and 6.

9 EXECUTE

Press EXECUTE to store all the allocated channels.

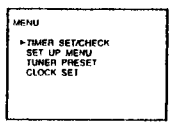
Step 6 Setting the clock

The last thing you need to do is set the date and clock.



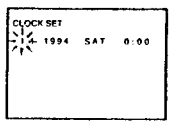
1 MENU

Press MENU.
The main MENU appears on the TV screen.



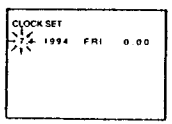
2 CURSOR, EXECUTE

Press the ⏶/⏷ buttons to move the cursor (►) to CLOCK SET, then press EXECUTE.
The CLOCK SET menu appears on the TV screen and the day flashes.



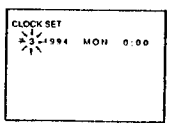
3 CURSOR

Set the day using the ⏶/⏷ buttons.
The day of the week is set automatically.



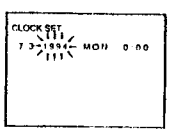
4 CURSOR

Press ⏵ so that the month flashes and set the month using the ⏶/⏷ buttons.



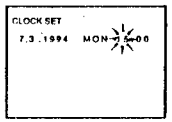
5 CURSOR

Press ⏵ so that the year flashes and set the year using the ⏶/⏷ buttons.



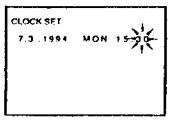
6 CURSOR

Press ⏵ so that the hours flash and set the hours using the ⏶/⏷ buttons.



7 CURSOR

Press ⏵ so that the minutes flash and set the minutes using the ⏶/⏷ buttons.



8 EXECUTE

Press EXECUTE to start the clock.

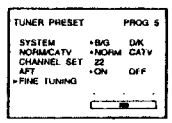
1-6

Additional tuning instructions

If the picture is not clear

Normally, the Auto Fine Tuning (AFT) function automatically tunes in channels clearly. If, however, the picture is not clear, you may also use the manual tuning function.

1 Press PROG +/– to select the programme number for which you cannot obtain a clear picture.
2 Press MENU, then select TUNER PRESET and press EXECUTE.
3 Select FINE TUNING. The fine tuning meter appears.



4 Press the ◁ / ▷ buttons to get a clearer picture, then press EXECUTE. Note that the AFT (Auto Fine Tuning) setting switches to OFF.

Disabling unwanted programme positions

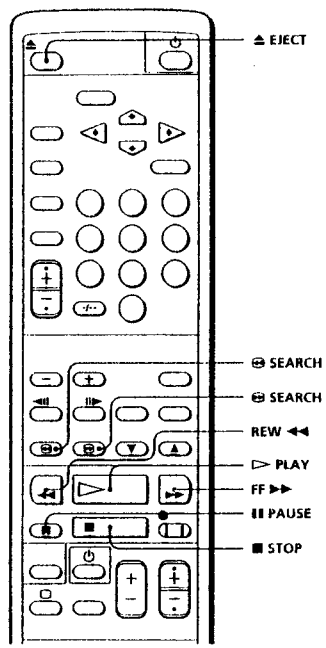
After tuning the TV channels, you can disable unused programme positions. Positions that are disabled will be skipped later when you press the PROG +/– buttons.

1 Press MENU, then select TUNER PRESET and press EXECUTE.
2 Press PROG +/– until the programme position you want to disable appears beside PROG.
3 Press number button "0" twice to display the number "0" beside CHANNEL SET.
4 Repeat steps **2** and **3** for other positions you want to disable.
5 Press EXECUTE.

1-7

Basic Operations

Playing a tape



Tip

- For further information on searching and playback functions, see "Playing/ searching at various speeds" on page **25**.

Note

- When a tape recorded in the LP (PAL), LP (NTSC), or EP (NTSC) mode is played back on this VCR, only a blue screen appears.

This section shows you how to play back a video tape.

1 Turn on your TV and tune in to the VCR:

- If the TV is connected to the VCR using an audio/video cable, set the TV to video input.
- If the TV is connected to the VCR using only the aerial cable, set the TV to the programme position for the VCR.

2 Insert a tape.
The VCR turns on automatically. The tape starts playing automatically if its safety tab has been removed.

3 Press ▷ PLAY to start playing.
When the tape reaches the end, the VCR automatically rewinds it to the beginning. (The power remains on.)

Additional tasks

To	Press
Stop play	■ STOP
Pause play	❚❚ PAUSE
Resume play after pause	❚❚ PAUSE or ▷ PLAY
Fast-forward the tape	FF ▶▶ during stop
Rewind the tape	REW ◀◀ during stop
Search forward	FF ▶▶ or ⊕ SEARCH during playback
Search backward	REW ◀◀ or ⊖ SEARCH during playback
Eject the tape	⏏ EJECT

Playing a tape (continued)

Note
- Depending on your TV, the following may occur while playing an NTSC-recorded tape:
  - The picture becomes black and white.
  - The picture shakes.
  - No picture appears on the TV screen.
  - Black streaks appear horizontally on the TV screen.
  - The colour density increases or decreases.

To set the colour system

If streaks appear during playback, set the COLOR SYSTEM switch on the VCR to conform to the system that the tape was recorded in. (The normal setting is AUTO.)

When your tape was recorded in	Set COLOR SYSTEM to
PAL	PAL or PAL/MESECAM
NTSC	NTSC
MESECAM	PAL/MESECAM

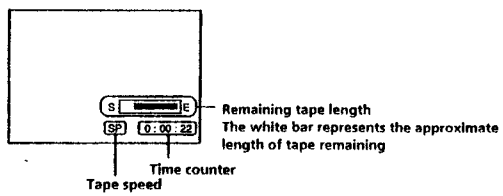
To play an NTSC-recorded tape

Set the NTSC PB switch on the VCR according to the colour system of your TV.

When your TV is	Set NTSC PB to
PAL	ON PAL TV
NTSC 4.43	NTSC 4.43

Displaying the remaining tape length and time counter

Press DISPLAY to turn the display on or off.



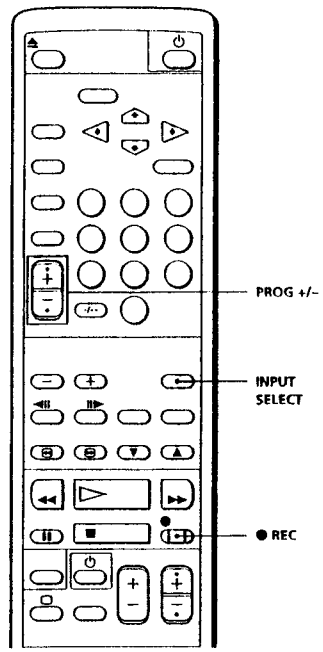
Notes
- The display will not appear while playing an NTSC-recorded tape.
- The display will not appear during still mode or slow-motion playback.

Using the time counter

At the point on a tape that you want to find later, press COUNTER RESET to reset the counter to"0H00M00S." When you rewind or advance the tape to this point, refer to the counter.

Notes
- When a tape is reinserted, the counter returns to "0H00M00S."
- The counter will not work on tape portions with no recording.
- If a tape has portions recorded in both PAL and NTSC systems, the time counter reading will not be correct. This discrepancy is due to the difference between the counting cycles of the two video systems.

Recording TV programmes



Note
- If you insert a tape with its safety tab removed, the VCR starts playing. To record on this tape, cover the tab hole.

Tips
- To select programme positions, you can also use the number buttons on the remote commander. For two-digit numbers, press the -/-- (ten's digit) button followed by the number buttons.
- You can select a video source from the LINE IN jacks using PROG +/– or INPUT SELECT. "L" is selected between the lowest programme position and the highest one.

This section shows you how to record TV programmes in the most basic way: manual recording. With manual recording, you start the VCR recording when the programme begins, then stop it when the programme ends. The VCR also provides the following ways of recording:
- Manually start recording, then stop it automatically—"Recording using the quick timer" (page **18**)
- Automatically start and stop recording—"Recording TV programmes using the timer" (page **20**)

1 **Turn on your TV and tune in to the VCR:**
- If the TV is connected to the VCR using an audio/video cable, set the TV to video input.
- If the TV is connected to the VCR using only the aerial cable, set the TV to the programme position for the VCR.

2 **Insert a tape with its safety tab in place.**

3 **Press PROG +/– until a programme position appears in the VCR's display window.**

4 **Select the desired programme position by pressing PROG +/–.**

5 **Start recording by pressing ● REC.**
When the tape reaches the end, the VCR automatically rewinds it to the beginning.

To stop recording

Press ■ STOP.

Recording TV programmes (continued)

Tips

- The display appears on the TV screen indicating information about the tape, but the information will not be recorded on the tape.
- If you do not want to watch TV while recording, you can turn off the TV.

Note

- If you have inserted a tape with its safety tab removed, the VCR ejects it when you press the ● REC button.

Maximum recording/playback time

You can only record and play back tapes in SP mode.
See the table below for the maximum recording/playback time in SP.

Tape type	Maximum recording/playback time
E-300	5 hrs.
E-240	4 hrs.
E-180	3 hrs.
E-120	2 hrs.
E-60	1 hr.

Recording using the quick timer

The quick timer enables you to record for a specified period of time in intervals of 30 minutes. Once you specify the recording time, the VCR automatically stops recording. Before you begin, check that the clock is set correctly.

Press QUICK TIMER until the desired duration appears in the display window. The TIMER REC indicator on the VCR lights up. Each press increases the recording duration in increments of 30 minutes as shown below.

0:00 → 0:30 → 1:00 ---- → 5:00 → 5:30 →

The recording duration decreases minute by minute to 0:00, then the VCR turns off automatically.

To stop recording

To stop quick-timer recording while the VCR is recording a programme, press ■ STOP.

To extend the recording duration while recording

Press QUICK TIMER until the desired duration appears in the display window.

Watching a TV programme while recording another

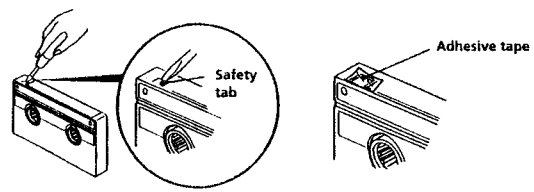
You can watch a TV programme and record another at the same time.

1 If the TV is connected to the VCR using an audio/video cable, set the TV to TV input. If the TV is connected to the VCR using only the aerial cable, skip this step.
2 Select the desired programme position on the TV.

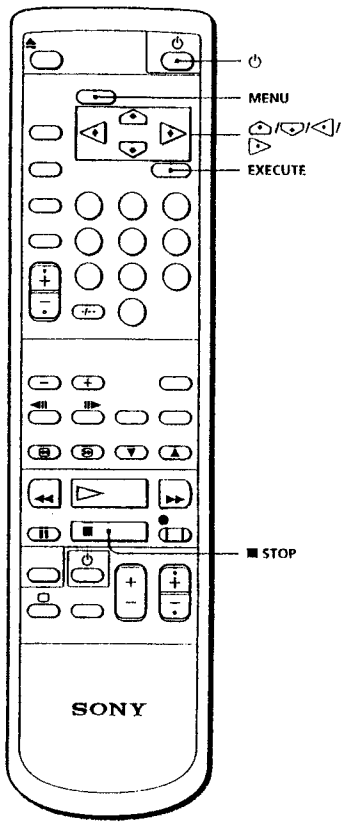
Saving a recording

Video tapes have a safety tab to protect against accidental recording. To prevent accidental erasure of a recording, break off the safety tab with a screwdriver or other tool. A tape with its safety tab removed ejects if you try to record on it.

To record on a tape with its safety tab removed, cover the tab hole with adhesive tape.



Recording TV programmes using the timer



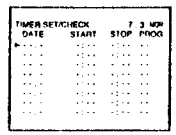
This section shows you how to let the VCR automatically start and stop recording TV programmes. You can preset up to eight programmes within a one month time frame.

Before you start...

- Check that the clock is set correctly.
- Insert a tape with its safety tab in place. Make sure the tape is longer than the total recording time.
- Turn on your TV and tune in to the VCR.

1 **Press MENU and select TIMER SET/CHECK.**

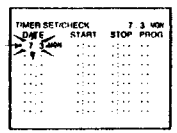
If the clock needs to be set, "PLEASE SET THE CLOCK" appears on the screen and the VCR automatically enters the clock setting mode.

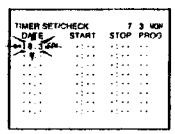


2 **Set the date to start recording:**

1 Press ▷.
Make sure today's date is flashing. If it isn't, reset the clock to the correct time.
2 Press △ to set the date and month.
The day of the week is set automatically.

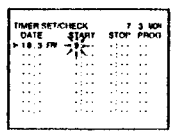
To record the same programme every day or the same day once a week, see "Daily/weekly recording" on page 22.

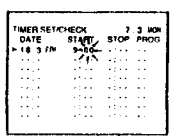




3 **Set the time to start recording:**

1 Press ▷ to flash the hours under "START," then press the △/▽ buttons to set the hours.
2 Press ▷ to flash the minutes under "START," then press the △/▽ buttons to set the minutes.





Tips

- To set the programme position, you can also use the PROG +/– or number buttons.
- To record a video source from the LINE IN jacks, keep pressing CURSOR (△/▽) or press INPUT SELECT to display "LINE" in the "PROG" position.

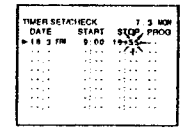
Tip

- To change or correct a setting before confirming it, press ◁ to flash the item you want to change and reset it.

Note

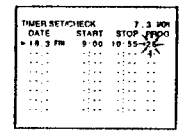
- If the power is interrupted for more than three hours while standing by for recording, timer settings are cleared. Reset the settings from beginning.

4 **Press ▷, then set the time to stop recording in the same way.**



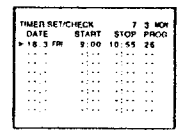
5 **Press ▷, then press the △/▽ buttons to select the programme position you want to record.**

Only the programme position preset in the VCR will appear.



6 **To confirm your programme, press ▷.**

All the settings stop flashing and the cursor (▶) appears in the leftmost column. To preset another timer setting, move the cursor to the next line using ▽ and repeat steps **2** to **6**.



7 **After making the desired timer settings, press EXECUTE, then press ⏻.**

The TIMER indicator on the VCR lights up and the VCR turns off and stands by for recording.
The VCR automatically turns on and starts recording at the preset start time, and turns off at the preset stop time.

To stop recording

To stop while the VCR is recording a programme, press ■ STOP.

Recording TV programmes using the timer (continued)

To use the VCR while recording
You can do the following tasks during timer recording.

To	Press
Reset the counter to "0H00M00S"	COUNTER RESET
Display tape information on the TV screen	DISPLAY
Check the timer settings	MENU and select TIMER SET/CHECK
Watch another TV programme	See "Watching a TV programme while recording another" on page 19.

Using the VCR before timer recording begins

Press ⏻ to turn off the TIMER indicator on the VCR. The VCR is ready for use.

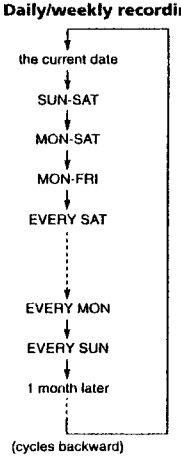
After using the VCR, press ⏻ again to turn on the TIMER indicator on the VCR.
Remember to reset the VCR to stand by for recording before the time you've set the VCR to start recording, or the timer setting will be cancelled.

Daily/weekly recording

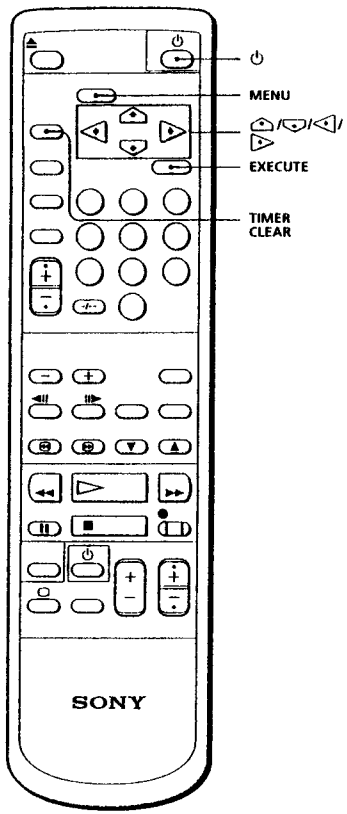
Daily recording records the same programme every day of the week; weekly recording records the same programme on the same day, every week.

When you set the date to start recording in step **2** of "Recording TV programmes using the timer," press ▽ until the desired day appears. Each time you press the button, the indication changes as shown on the left.

Daily/weekly recording



Checking/changing/cancelling timer settings

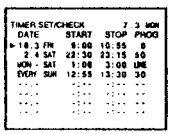


This section shows you how to check, change and cancel the timer settings after you've stored them in the VCR.

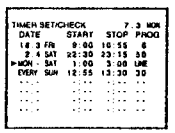
Before you start...
- Turn on your TV and tune in to the VCR.

1 **Press ⏻ to turn off the TIMER indicator on the VCR.**

2 **Press MENU and select TIMER SET/CHECK.**



3 **Check the timer settings:**
- If you do not want to change or cancel the settings, press EXECUTE, then press ⏻ to return to recording standby.
- If you want to change or cancel the settings, press the △/▽ buttons to move the cursor (▶) to the setting you want to change or cancel.

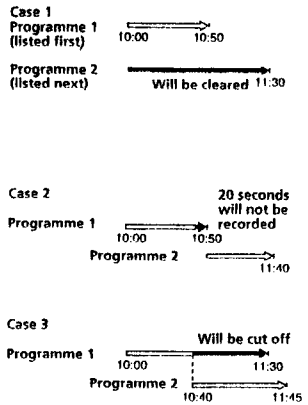


4 **Change or cancel the timer setting:**
- To change the setting, press the ◁/▷ buttons to flash the item you want to change, and reset it using the △/▽ buttons. Then, press ▷ to move the cursor to the leftmost column.
- To cancel the setting, press TIMER CLEAR.

5 **Press EXECUTE.**
The VCR returns to the original screen. When there are any other timer settings left in the TIMER SET/CHECK menu, press ⏻ to return recording standby.

To check the timer settings during timer recording
Press MENU and select TIMER SET/CHECK. After checking, press EXECUTE to turn off the display.

Checking/changing/cancelling timer settings (continued)



When the timer settings overlap

The VCR will not record overlapping programmes. If any of your timer settings overlap, change the settings.

Case 1: ***If you preset two programmes to start recording at the same time...***

The programme listed first in the TIMER SET/CHECK menu has priority over the other programmes. The timer settings of lower priority programmes will be erased from the TIMER SET/CHECK menu when the first programme begins recording.

Case 2: ***If you preset programme 2 to start recording at the same time you preset programme 1 to finish recording...***

The last 20 seconds of programme 1 will not be recorded because the VCR will enter recording pause for programme 2 before programme 1 is finished.

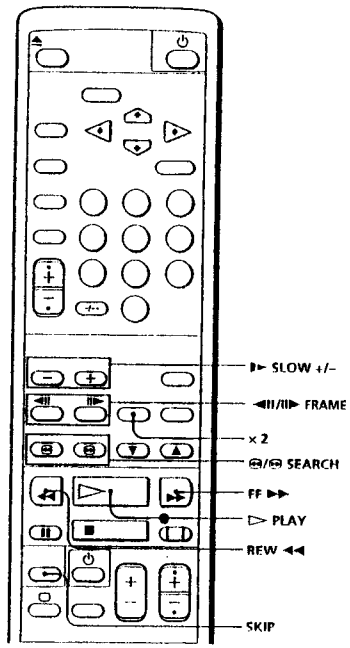
Case 3: ***If you preset programme 2 to start recording before programme 1 is finished recording...***

Programme 2 will start recording before programme 1 has finished.

1-12

Additional Operations

Playing/searching at various speeds



Tip

- If the picture is shaking while in the still mode, adjust the picture with the ▼/▲ STILL ADJUST buttons.

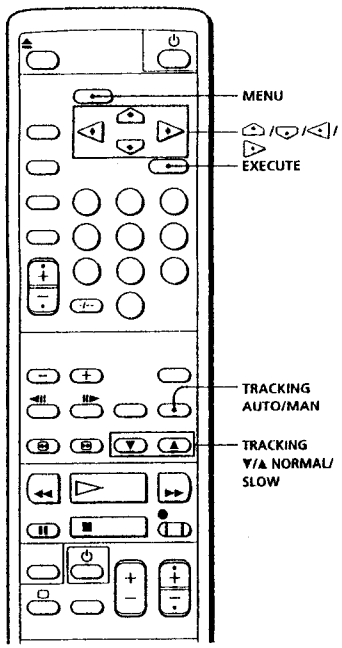
Note

- The colour of the picture may not be reproduced normally while playing back a tape at various speeds or pausing.

You can play back a tape at various speeds: high-speed, slow motion, frame by frame and so on. These options are also useful for searching for a specific point during playback. The sound is muted during these operations.

Playback options	Operation	To resume normal playback
Fast-forwarding/ Rewinding	During stop, press FF ►► or REW ◄◄.	Press ▷ PLAY.
Viewing the picture during fast-forward or rewind	During fast-forward, keep pressing FF ►►. During rewind, keep pressing REW ◄◄.	To return to the previous mode, release the button.
Playing at twice the normal speed	During playback or pause, press × 2.	Press ▷ PLAY.
Locking in a high-speed picture	During playback or pause, press ⊕ SEARCH or ⊖ SEARCH. To change direction, press ◄II FRAME (backward) or II► FRAME (forward).	Press ▷ PLAY.
Locking in a slow-motion picture	During playback or pause, press I► SLOW+/–. You can increase the playback speed with the + button and decrease the speed with the – button. To change direction, press ◄II FRAME (backward) or II► FRAME (forward).	Press ▷ PLAY.
Playing frame by frame	During pause, press II► FRAME to advance the picture one frame or ◄II FRAME to reverse the picture one frame. Keep pressing the button to advance or reverse one frame every one second.	Press ▷ PLAY.
Playing in reverse	During playback, press ◄II FRAME.	Press ▷ PLAY.
Skipping a scene	During playback, press SKIP. Pressing once skips about 30 seconds.	The VCR automatically resumes normal playback.
Rewind and restart play	During stop, press ▷ PLAY on the VCR while pressing REW ◄◄ on the VCR.	——

Adjusting the picture



Tip
- We recommend you leave OPC ON even when recording on a tape played back on a VCR without the OPC function.

The VCR automatically adjusts the picture for the best possible playback or recording. If, however, you find the automatic adjustment unsatisfactory, you can adjust the picture manually.

Adjusting the tracking

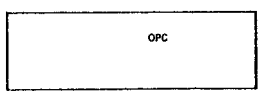
Though the VCR automatically adjusts the tracking when playing a tape (the AUTO TRACKING indicator flashes in the display window, then lights steadily), distortion may occur if the tape was recorded in poor condition. If so, manually adjust the tracking condition.

Press the ▼/▲ TRACKING NORMAL/SLOW buttons to display the tracking meter. The distortion should disappear as you press one of the two buttons. If you cannot get a clear picture with manual adjustment, press TRACKING AUTO/MAN to return to automatic adjustment.

Tracking meter

About Optimum Picture Control (OPC) *(SLV-X312ME/X312PS/X312SG)*

Optimum Picture Control (OPC) automatically improves playback quality by adjusting the VCR to the condition of the video heads and tape. To maintain better picture quality, we recommend that you leave OPC ON on the SET UP MENU screen (with the OPC indicator in the display window lit).



To use OPC during playback
The OPC function automatically works on all types of tapes, including rental tapes. You can play a tape using the OPC function even if the tape was not recorded with it.

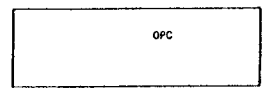
To deactivate the OPC
Press MENU and select SET UP MENU, then set OPC to OFF. The OPC indicator in the display window goes off.

Tip
- We recommend you leave OPC on even when recording on a tape played back on a VCR without the OPC function.

Notes
- Tapes recorded using the OPC function are played back normally on VCRs that do not have the OPC function.
- Press ❚❚ PAUSE to release recording after the OPC indicator stops flashing. If you start recording before the OPC indicator stops flashing, the OPC function is cancelled.

About Optimum Picture Control (OPC) *(SLV-E150EE)*

Optimum Picture Control (OPC) automatically improves recording and playback quality by adjusting the VCR to the condition of the video heads and tape. To maintain better picture quality, we recommend that you leave OPC ON on the SET UP MENU screen. (with the OPC indicator in the display window lit).



To use OPC during playback
The OPC function automatically works on all types of tapes, including rental tapes. You can play a tape using the OPC function even if the tape was not recorded with it.

To use OPC while recording
Whenever you insert a tape and first start recording, the VCR adjusts to the tape using the OPC function (the OPC indicator flashes rapidly). This adjustment is retained until the tape is ejected. There is a short delay before the VCR actually starts recording while the VCR analyzes the tape.

If you want to start recording precisely the first time you record, set the VCR to recording pause mode (the OPC indicator flashes slowly) and press ● REC to let the VCR analyze the tape. When the OPC indicator stops flashing, press ❚❚ PAUSE to start recording. Recording begins immediately.

To deactivate the OPC
Press MENU and select SET UP MENU, then set OPC to OFF. The OPC indicator in the display window goes off.

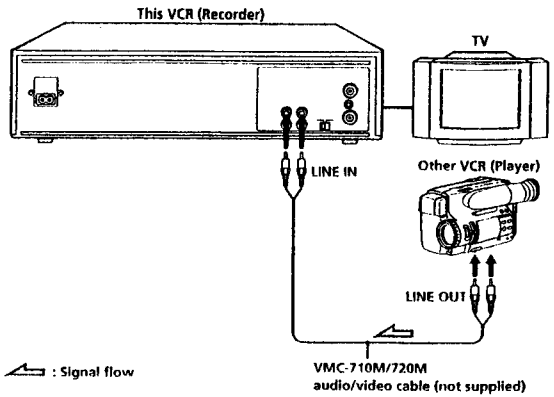
Reducing streaks and/or snow *(SLV-X312ME/X312PS/X312SG)*

If you do not satisfy the picture quality while playing a tape, even if OPC is on, press MENU and select SET UP MENU, then set RENTAL to ON according to your taste.

Editing with another VCR

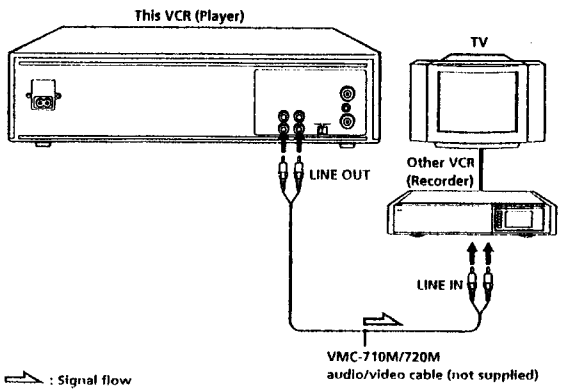
This section shows you how to edit to or from another VCR or camcorder. You can make a copy of a tape using this VCR for recording or playback.

How to hook up to record on this VCR



Tip
- Make sure you connect the plugs to jacks of the same colour.

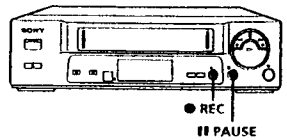
How to hook up to record to another VCR



Note
- When connecting the VCRs, do not simultaneously connect the LINE IN and LINE OUT jacks on your VCR. A humming noise may occur if you do this.

1-14 E

Operation (when recording on this VCR)



Before you start editing
- Press INPUT SELECT to display "L" in the display window.

1 **Insert a source tape with its safety tab removed into the other (playback) VCR. Search for the point to start playback and set it to playback pause.**

2 **Insert a tape into this (recording) VCR. Search for the point to start recording and press II PAUSE.**

3 **Press the ● REC button on this VCR and set it to recording pause.**

4 **To start editing, press the II PAUSE buttons on both VCRs to release the VCRs from pause.**
For best results, press the pause button on the other VCR just before pressing II PAUSE on this VCR.

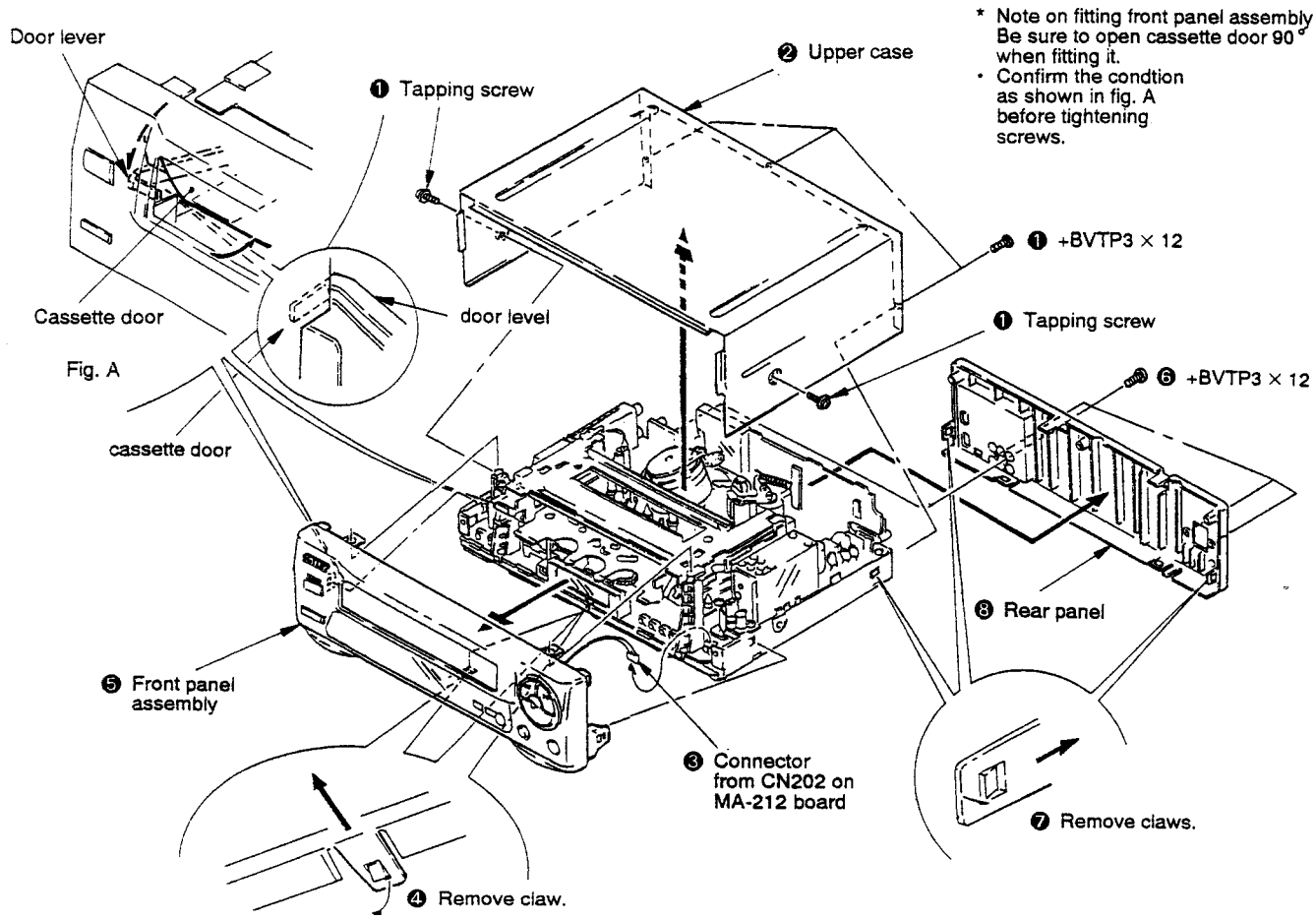
Tips
- To release the VCRs from pause, use the II PAUSE buttons on the VCRs so that you can edit more precisely.
- To cut out unwanted scenes while editing, press II PAUSE on this VCR when an unwanted scene begins. When it ends, press II PAUSE again to resume recording (Assemble Editing).

To stop editing
Press the ■ STOP buttons on both VCRs.

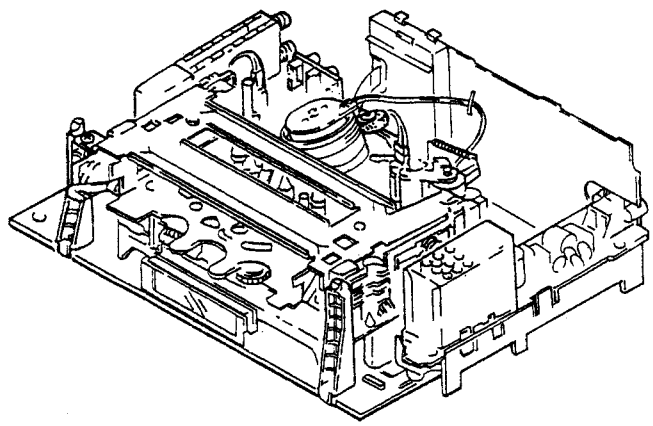
SECTION 2
DISASSEMBLY

Note: Follow the disassembly procedure in the numerical order given.

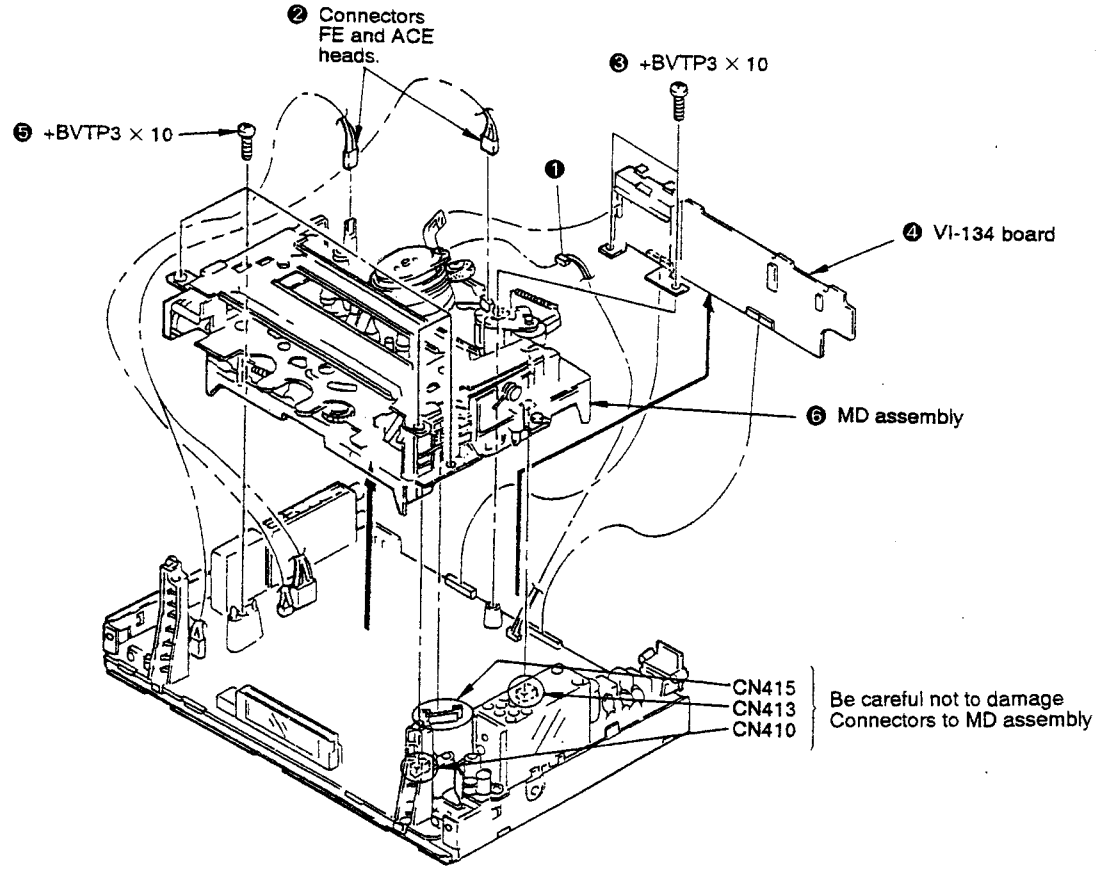
2-1. FRONT PANEL ASSEMBLY AND CASE


Door lever
❷ Upper case
❶ Tapping screw
* Note on fitting front panel assembly
Be sure to open cassette door 90° when fitting it.
• Confirm the condtion as shown in fig. A before tightening screws.
❶ +BVTP3 × 12
Cassette door
door level
❶ Tapping screw
Fig. A
❻ +BVTP3 × 12
cassette door
❽ Rear panel
❺ Front panel assembly
❸ Connector from CN202 on MA-212 board
❼ Remove claws.
❹ Remove claw.

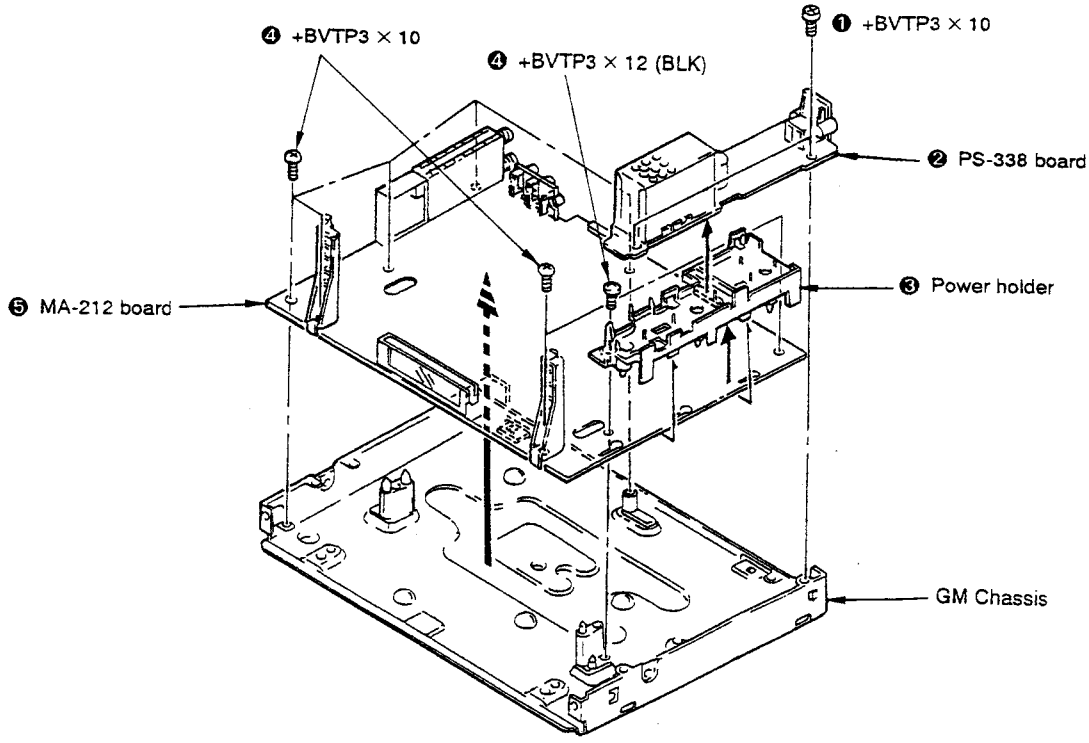
*On servicing, from above condition, GM chassis is removed, it is possible to check easily.



2-2. VI-134 BOARD AND MD ASSEMBLY

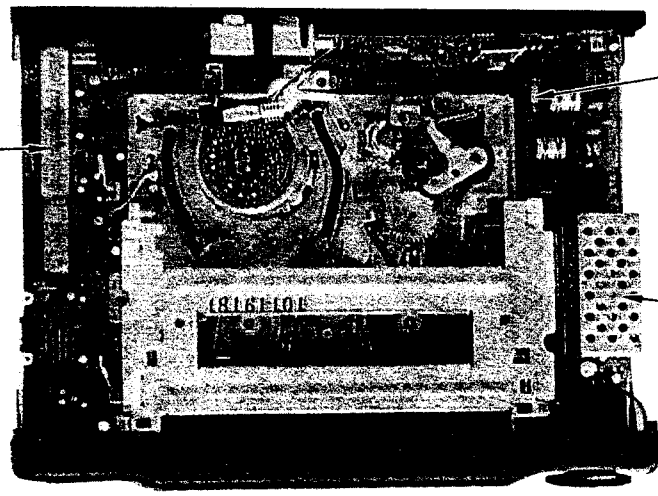


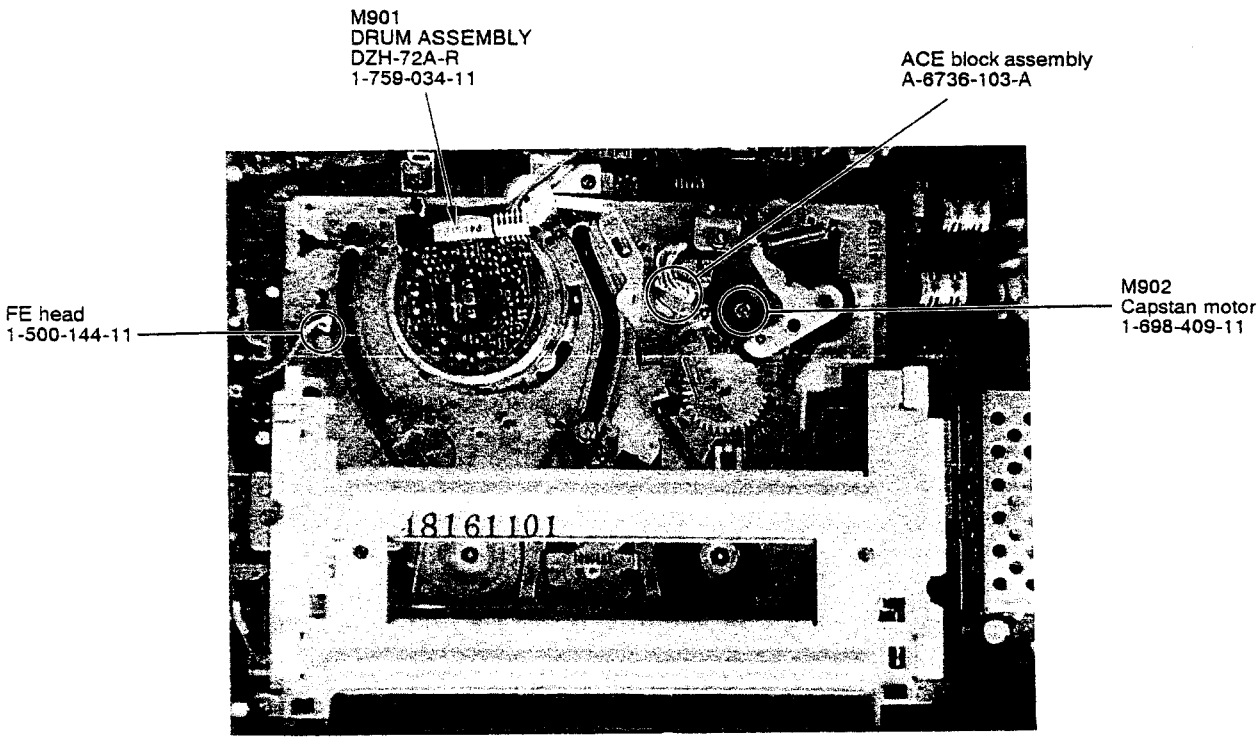
2-3. MA-212 AND PS-338 BOARDS



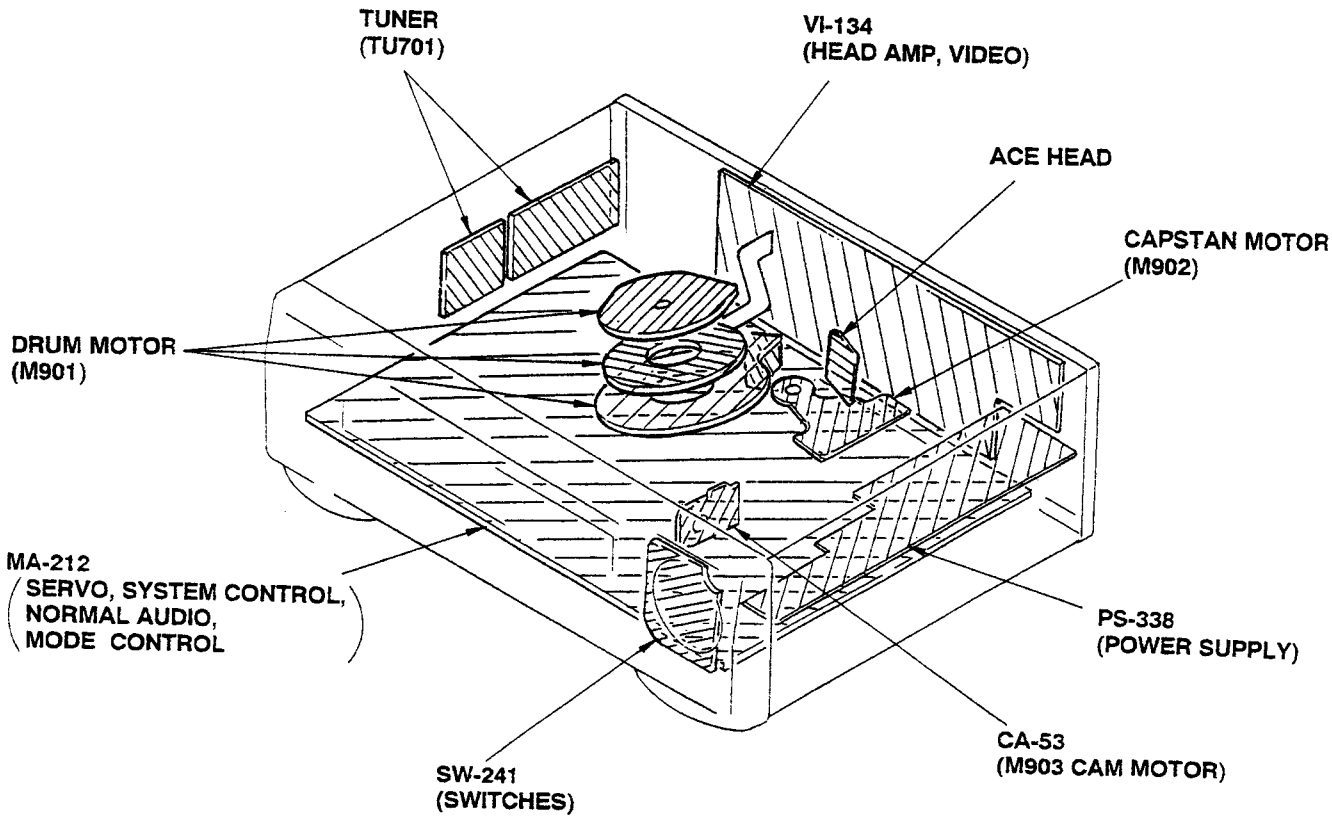
2-4. INTERNAL VIEWS

– Top Side –



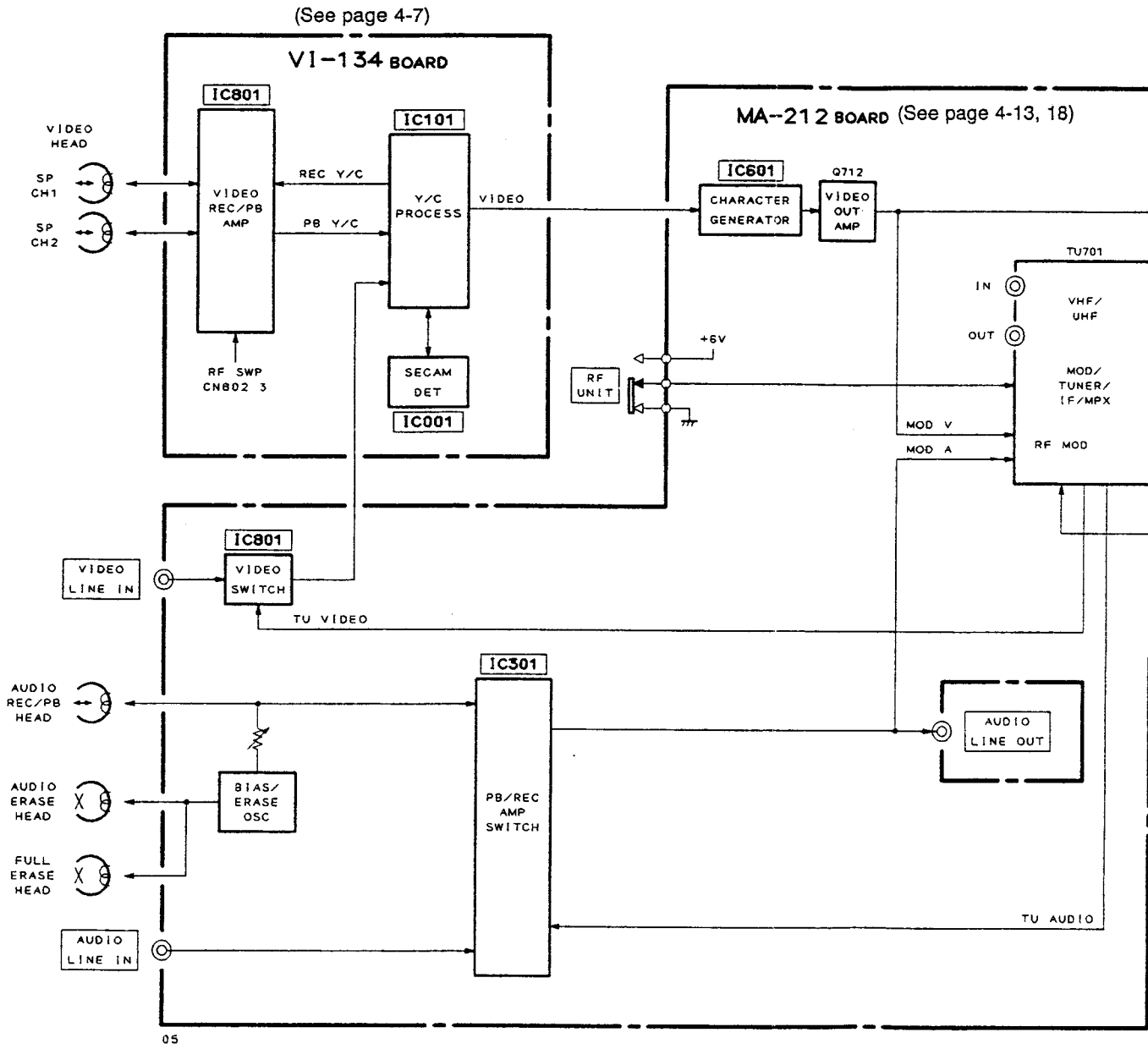


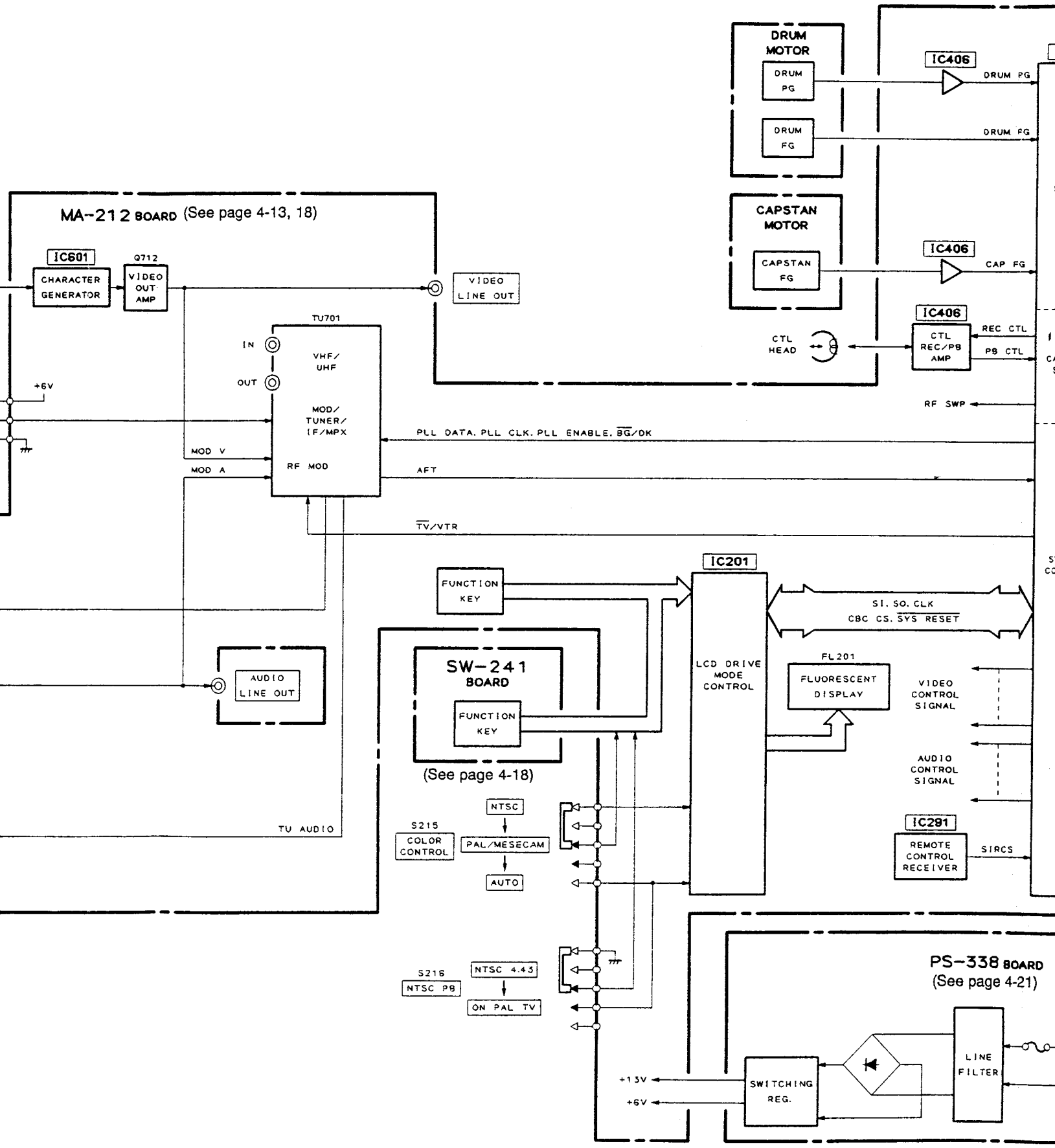
2-5. CIRCUIT BOARDS LOCATION

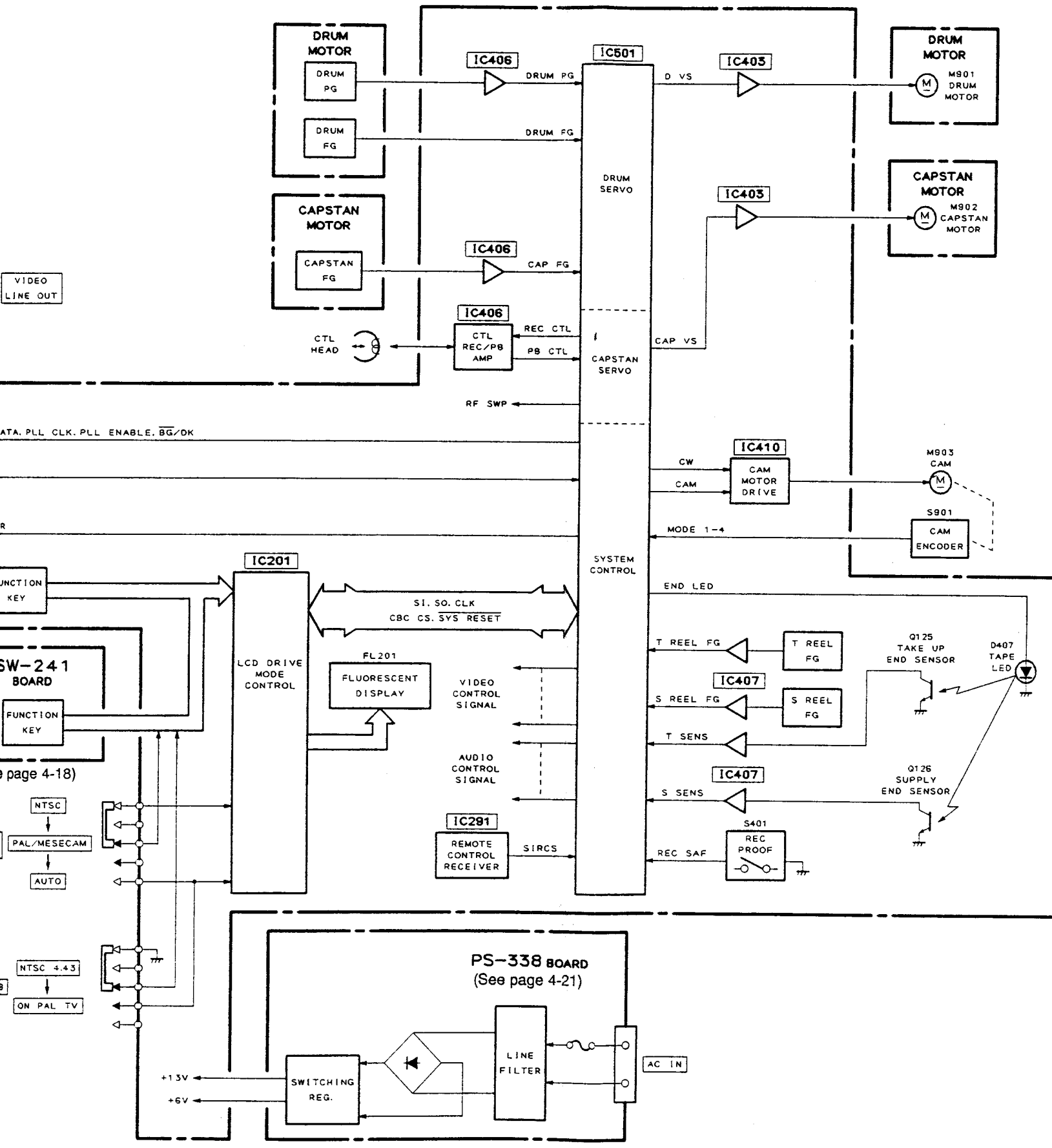


SECTION 3
BLOCK DIAGRAMS

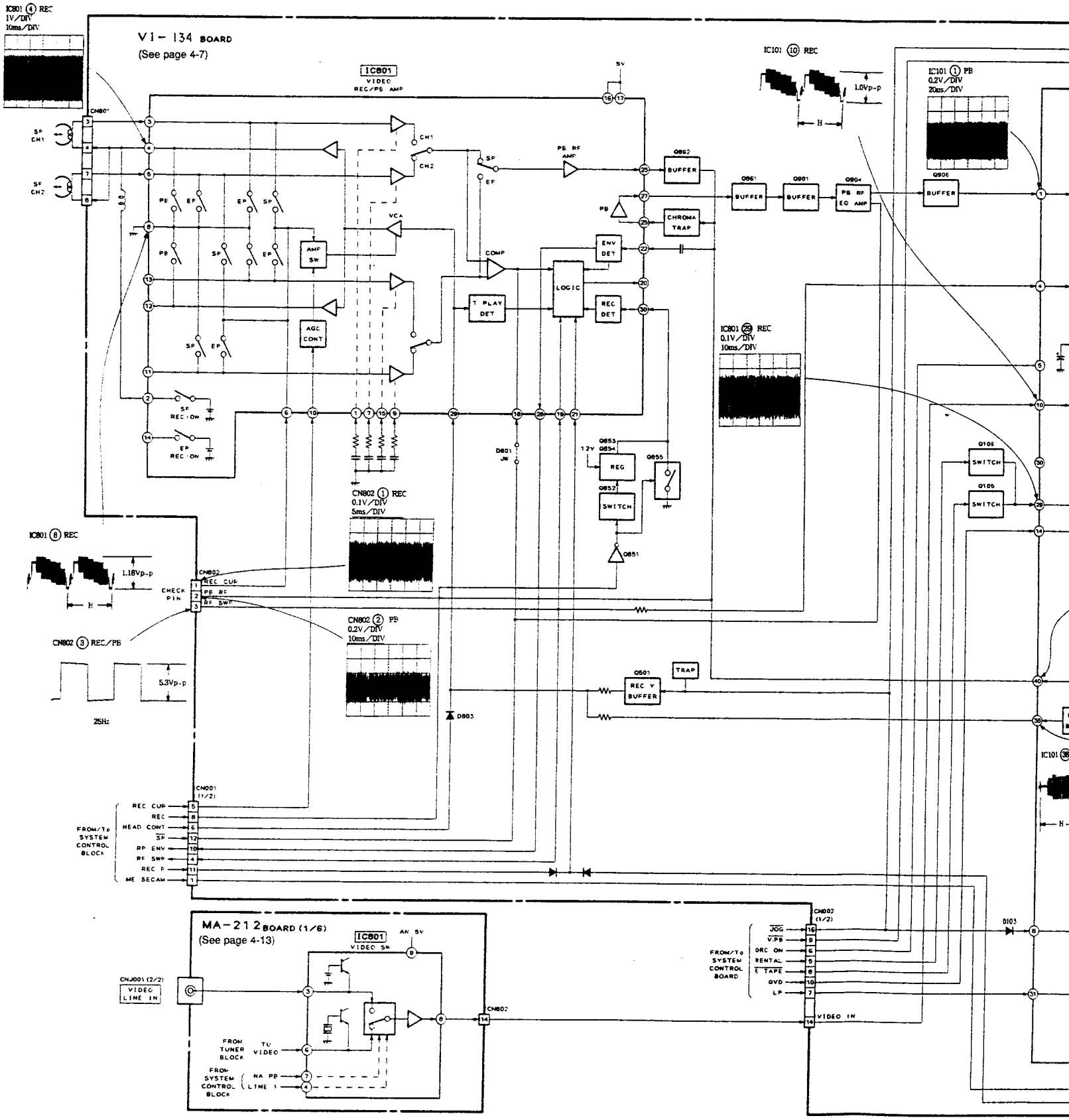
3-1. OVERALL BLOCK DIAGRAM

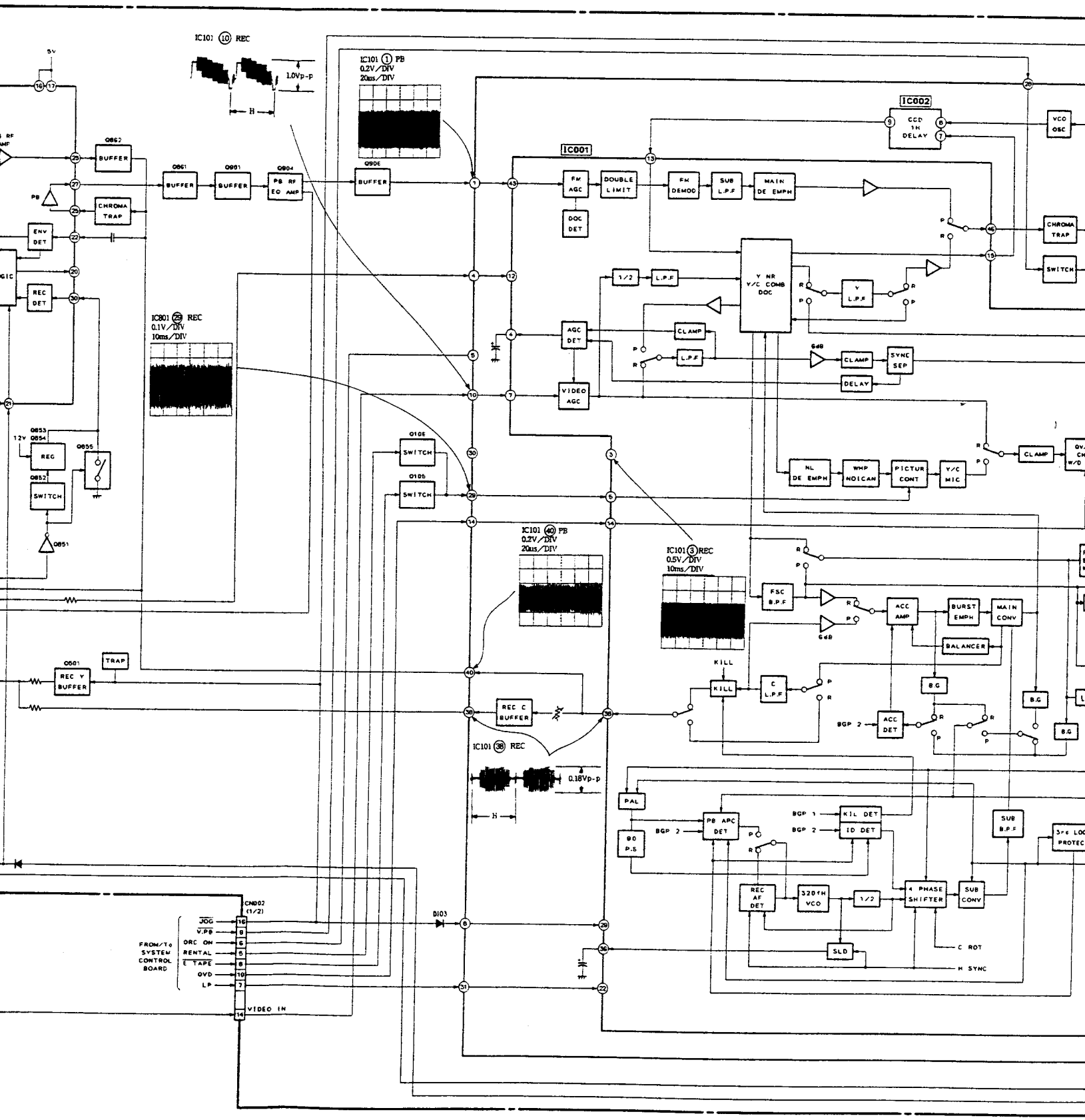


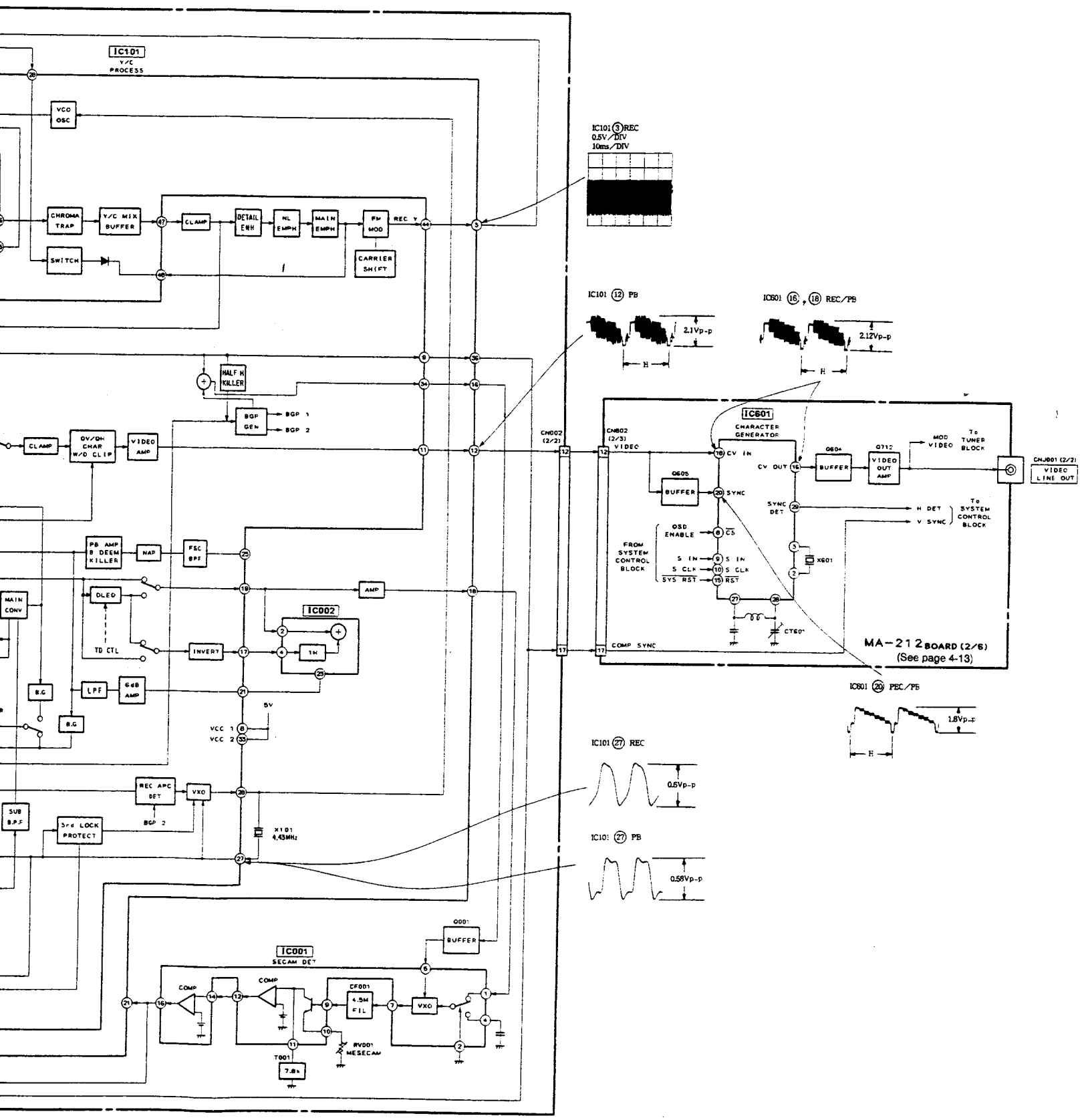

DRUM MOTOR
DRUM PG
DRUM FG
IC406
DRUM PG
DRUM FG
CAPSTAN MOTOR
CAPSTAN FG
IC406
CAP FG
IC406
CTL REC/PB AMP
REC CTL
PB CTL
CTL HEAD
MA-212 BOARD (See page 4-13, 18)
IC601
CHARACTER GENERATOR
Q712
VIDEO OUT AMP
VIDEO LINE OUT
TU701
IN
OUT
VHF/ UHF
MOD/ TUNER/ IF/MPX
RF MOD
+6V
MOD V
MOD A
RF SWP
PLL DATA. PLL CLK. PLL ENABLE. BG/DK
AFT
TV/VTR
IC201
FUNCTION KEY
SI. SO. CLK
CBC CS. SYS RESET
LCD DRIVE MODE CONTROL
FL201
FLUORESCENT DISPLAY
VIDEO CONTROL SIGNAL
AUDIO CONTROL SIGNAL
AUDIO LINE OUT
SW-241 BOARD
FUNCTION KEY
(See page 4-18)
NTSC
S215
COLOR CONTROL
PAL/MESECAM
AUTO
TU AUDIO
IC291
REMOTE CONTROL RECEIVER
SIRCS
S216
NTSC PB
NTSC 4.43
ON PAL TV
PS-338 BOARD
(See page 4-21)
+13V
+6V
SWITCHING REG.
LINE FILTER


DRUM MOTOR
DRUM PG
DRUM FG
IC406
DRUM PG
DRUM FG
IC501
DRUM SERVO
D VS
IC403
DRUM MOTOR
M901 DRUM MOTOR
CAPSTAN MOTOR
CAPSTAN FG
IC406
CAP FG
IC403
CAPSTAN MOTOR
M902 CAPSTAN MOTOR
VIDEO LINE OUT
IC406
CTL HEAD
CTL REC/PB AMP
REC CTL
PB CTL
CAPSTAN SERVO
CAP VS
RF SWP
ATA, PLL CLK, PLL ENABLE, BG/DK
IC410
CW
CAM
CAM MOTOR DRIVE
M903 CAM
S901
CAM ENCODER
MODE 1-4
R
SYSTEM CONTROL
END LED
IC201
UNCTION KEY
SW-241 BOARD
FUNCTION KEY
SI, SO, CLK
CBC CS, SYS RESET
LCD DRIVE MODE CONTROL
FL201
FLUORESCENT DISPLAY
VIDEO CONTROL SIGNAL
AUDIO CONTROL SIGNAL
T REEL FG
T REEL FG
Q125 TAKE UP END SENSOR
D407 TAPE LED
IC407
S REEL FG
S REEL FG
T SENS
IC407
S SENS
Q126 SUPPLY END SENSOR
IC291
REMOTE CONTROL RECEIVER
SIRCS
S401
REC PROOF
REC SAF
e page 4-18)
NTSC
PAL/MESECAM
AUTO
NTSC 4.43
ON PAL TV
PS-338 BOARD
(See page 4-21)
LINE FILTER
AC IN
+13V
+6V
SWITCHING REG.

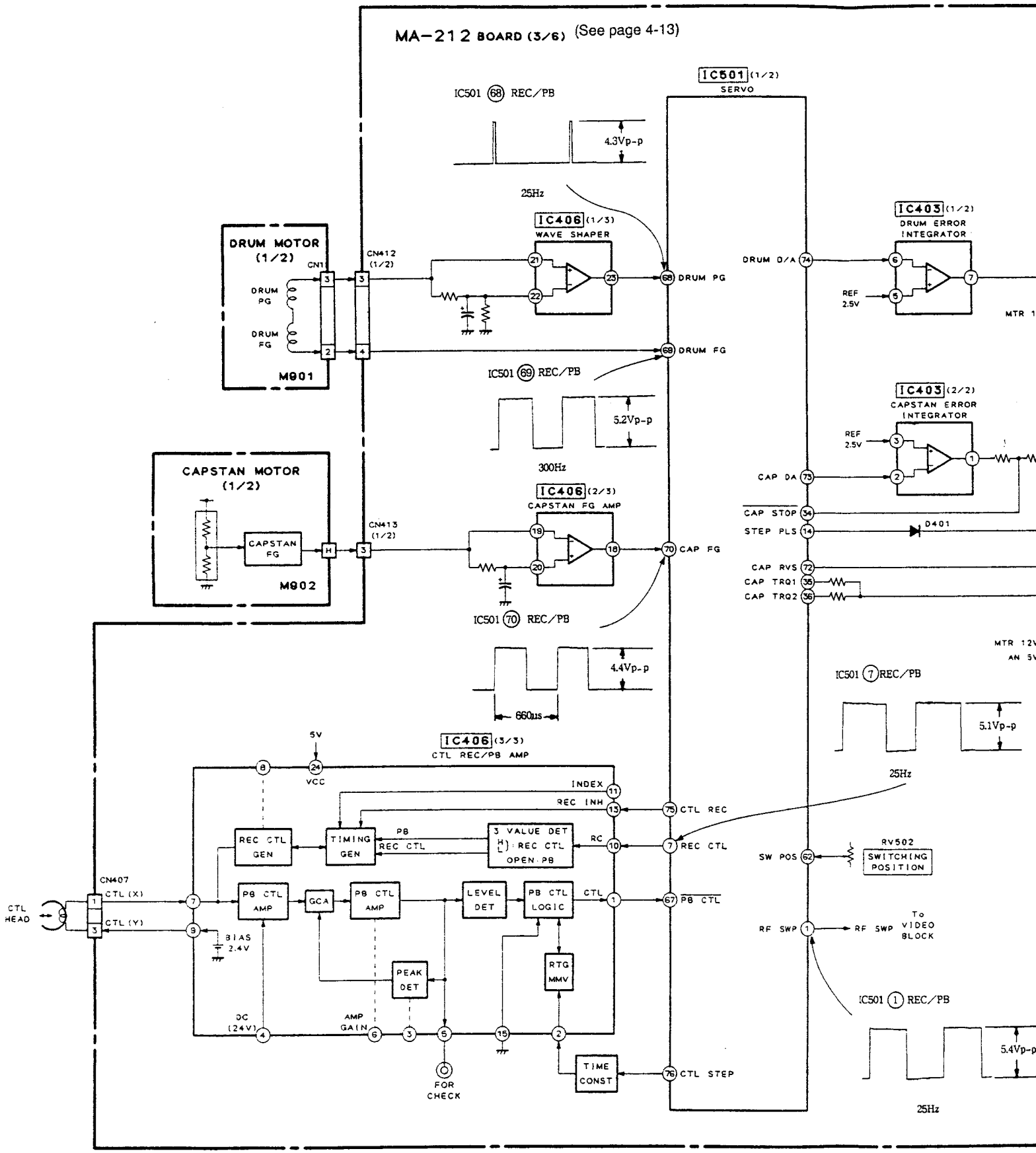
3-2. VIDEO BLOCK DIAGRAM



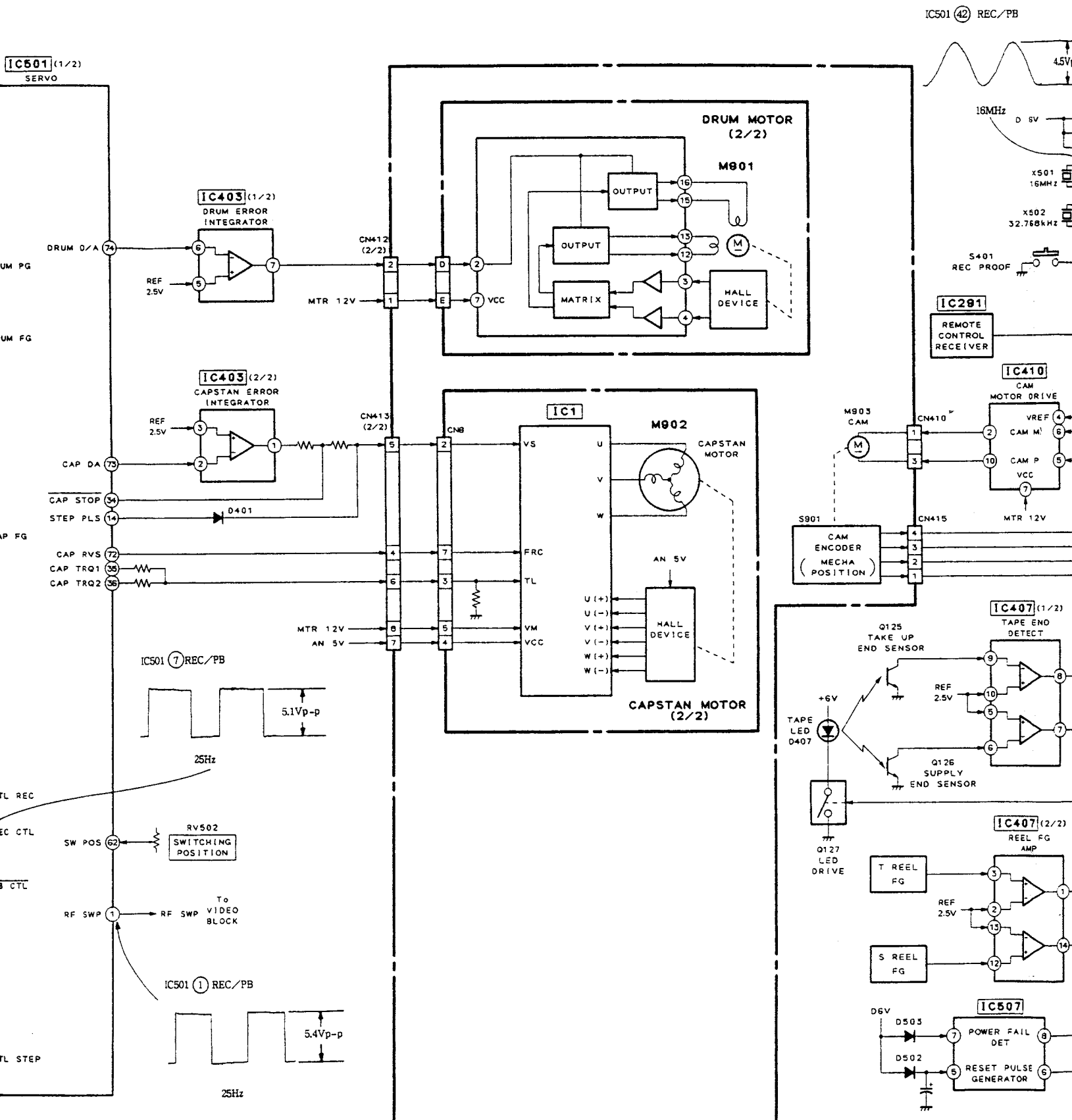

IC101 (10) REC
1.0Vp-p
H
IC101 (1) PB
0.2V/DIV
20ms/DIV
IC002
CCD 1H DELAY
VCO OSC
IC001
BUFFER
CHROMA TRAP
ENV DET
REC DET
PB RF EQ AMP
FM AGC
DOUBLE LIMIT
FM DEMOD
SUB L.P.F
MAIN DE EMPH
DOC DET
Y NR Y/C COMB DOC
Y L.P.F
SWITCH
1/2
L.P.F
AGC DET
CLAMP
SYNC SEP
DELAY
VIDEO AGC
IC801 (29) REC
0.1V/DIV
10ms/DIV
REG
SWITCH
NL DE EMPH
WHP NOICAN
PICTUR CONT
Y/C MIC
IC101 (40) PB
0.2V/DIV
20ms/DIV
IC101 (3) REC
0.5V/DIV
10ms/DIV
FSC B.P.F
ACC AMP
BURST EMPH
MAIN CONV
BALANCER
TRAP
REC Y BUFFER
KILL
C L.P.F
B.G
ACC DET
REC C BUFFER
IC101 (38) REC
0.18Vp-p
PAL
90 P.S
PB APC DET
KIL DET
ID DET
SUB B.P.F
REC AF DET
320fH VCO
4 PHASE SHIFTER
SUB CONV
SLD
C ROT
H SYNC
CN802 (1/2)
JOG
V.PB
ORC ON
RENTAL
E TAPE
QVD
LP
VIDEO IN
FROM/TO SYSTEM CONTROL BOARD
D103

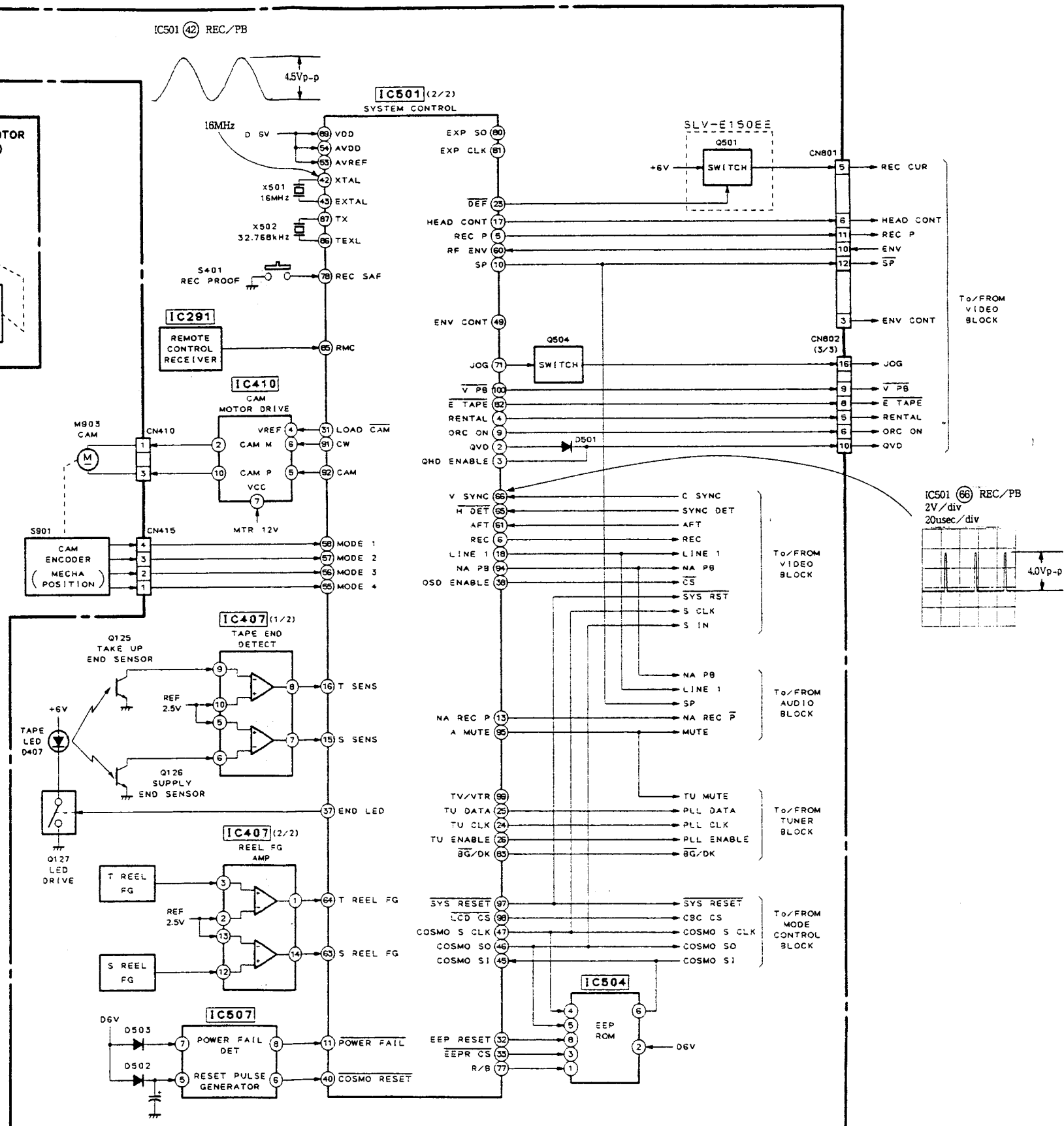

IC101
Y/C PROCESS
VCO OSC
CHROMA TRAP
Y/C MIX BUFFER
CLAMP
DETAIL ENH
NL EMPH
MAIN EMPH
FM MOD
REC Y
SWITCH
CARRIER SHIFT
HALF H KILLER
BGP GEN
BGP 1
BGP 2
CLAMP
CV/DN CHAR W/O CLIP
VIDEO AMP
PB AMP B DEEM KILLER
NAP
FSC BPF
MAIN CONV
DLEQ
TD CTL
INVERT
AMP
IC002
1H
B.G
LPF
6dB AMP
5V
VCC 1
VCC 2
REC APC DET
VXO
SUB B.P.F
3rd LOCK PROTECT
X101
4.43MHz
IC001
SECAM DET
COMP
COMP
CF001
4.5M FIL
VXO
Q001
BUFFER
RV001
MESECAM
T001
7.8k
CN002 (2/2)
CN802 (2/3) VIDEO
IC601
CHARACTER GENERATOR
CV IN
CV OUT
SYNC
SYNC DET
H DET
V SYNC
To SYSTEM CONTROL BLOCK
Q604
BUFFER
Q712
VIDEO OUT AMP
MOD VIDEO
To TUNER BLOCK
CNJ001 (2/2)
VIDEO LINE OUT
OSD ENABLE
CS
S IN
S CLK
SYS RST
RST
FROM SYSTEM CONTROL BLOCK
XG01
CT601
COMP SYNC
MA-212 BOARD (2/6)
(See page 4-13)
IC101 (3) REC
0.5V/DIV
10ms/DIV
IC101 (12) PB
2.1Vp-p
H
IC601 (16), (18) REC/PB
2.12Vp-p
H
IC601 (20) PEC/PB
1.8Vp-p
H
IC101 (27) REC
0.5Vp-p
IC101 (27) PB
0.58Vp-p

3-3. SERVO, SYSTEM CONTROL BLOCK DIAGRAM

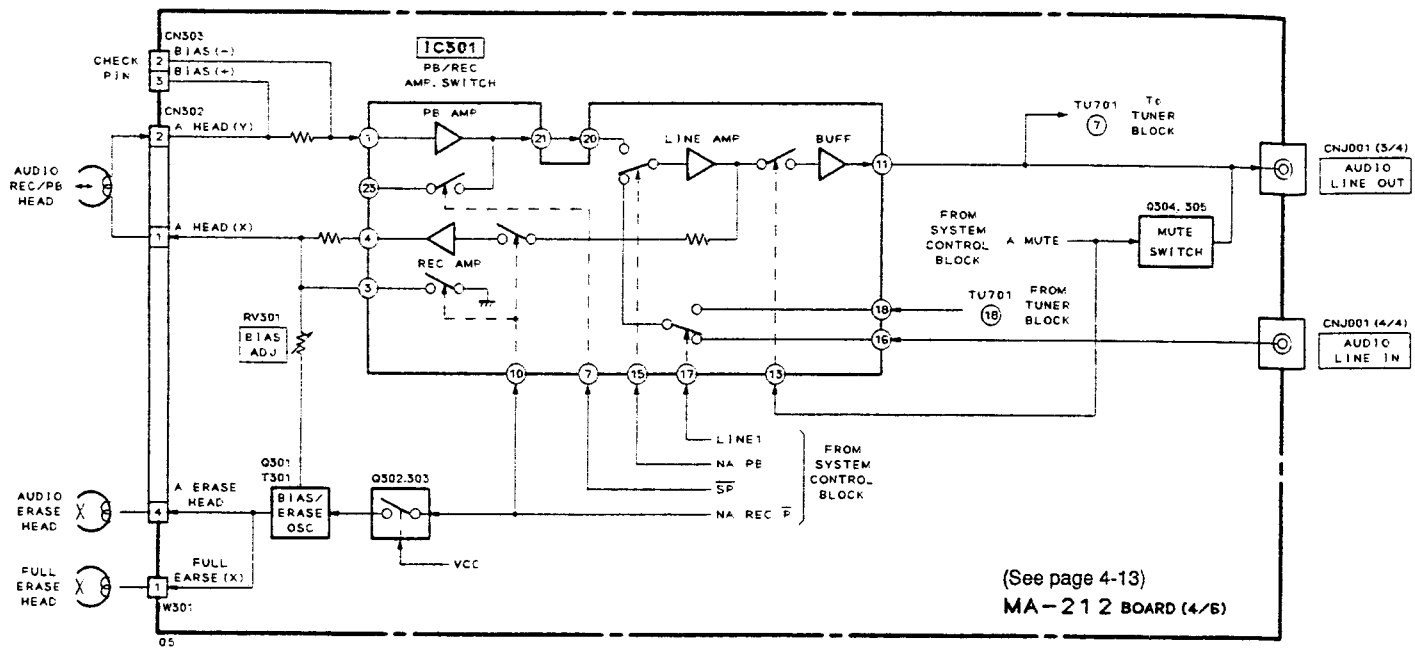


05

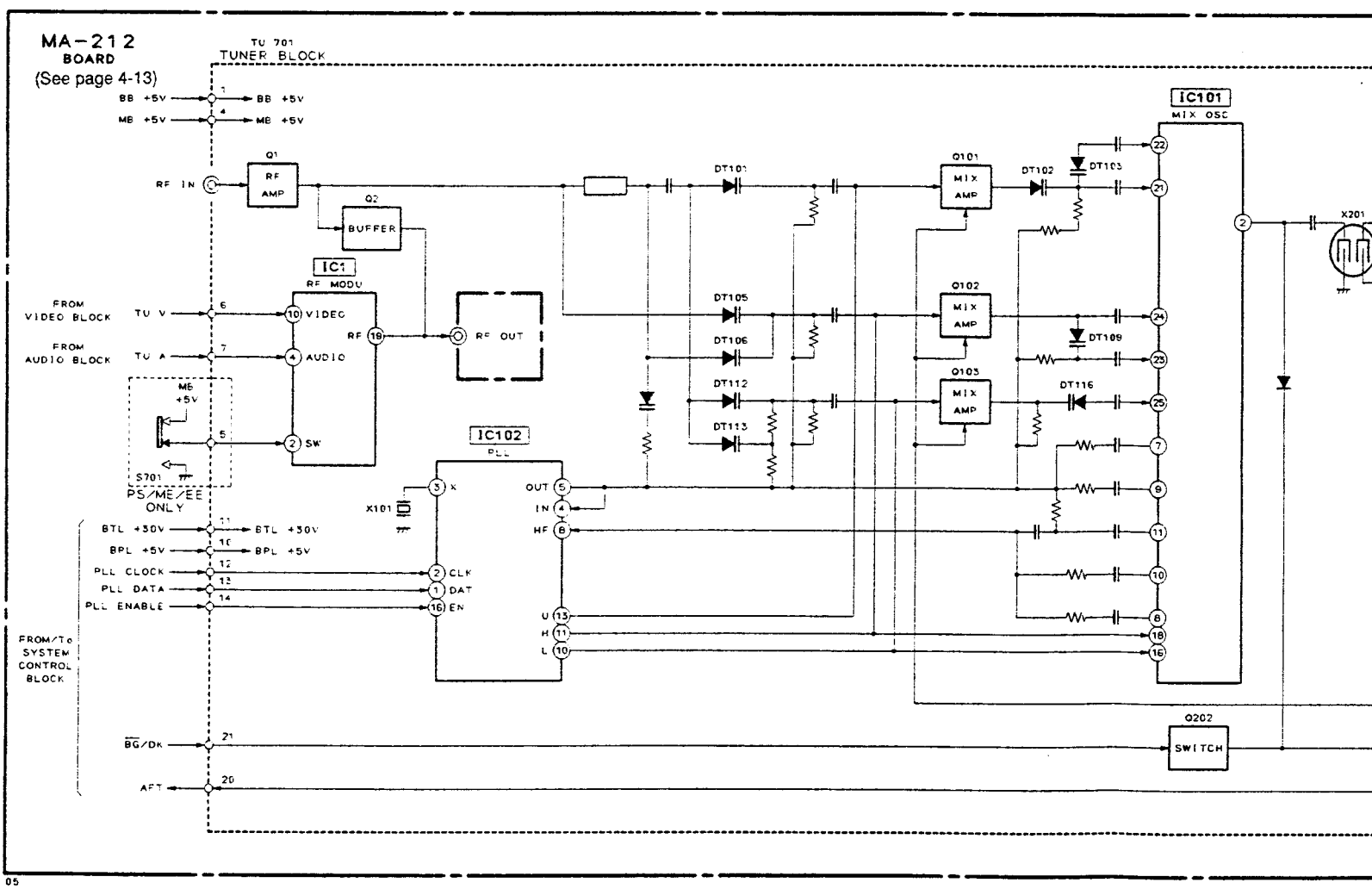

IC501 (1/2)
SERVO
IC403 (1/2)
DRUM ERROR INTEGRATOR
DRUM D/A 74
REF 2.5V
MTR 12V
CN412 (2/2)
DRUM MOTOR (2/2)
M901
OUTPUT
OUTPUT
MATRIX
HALL DEVICE
VCC
IC403 (2/2)
CAPSTAN ERROR INTEGRATOR
CAP DA 73
CAP STOP 34
STEP PLS 14
D401
CAP RVS 72
CAP TRQ1 35
CAP TRQ2 36
CN413 (2/2)
CN8
IC1
M902
CAPSTAN MOTOR
VS
FRC
TL
VM
VCC
U
V
W
U (+)
U (-)
V (+)
V (-)
W (+)
W (-)
AN 5V
HALL DEVICE
CAPSTAN MOTOR (2/2)
IC501 (7) REC/PB
5.1Vp-p
25Hz
TL REC
EC CTL
SW POS 62
RV502
SWITCHING POSITION
RF SWP 1
RF SWP
To VIDEO BLOCK
IC501 (1) REC/PB
5.4Vp-p
25Hz
TL STEP
IC501 (42) REC/PB
4.5Vp-p
16MHz
D 5V
X501 16MHz
X502 32.768kHz
S401 REC PROOF
IC291
REMOTE CONTROL RECEIVER
IC410
CAM MOTOR DRIVE
M903 CAM
CN410
VREF
CAM M
CAM P
VCC
MTR 12V
S901
CAM ENCODER (MECHA POSITION)
CN415
IC407 (1/2)
TAPE END DETECT
Q125 TAKE UP END SENSOR
+6V
TAPE LED D407
REF 2.5V
Q126 SUPPLY END SENSOR
Q127 LED DRIVE
IC407 (2/2)
REEL FG AMP
T REEL FG
S REEL FG
REF 2.5V
D6V
IC507
D503
D502
POWER FAIL DET
RESET PULSE GENERATOR

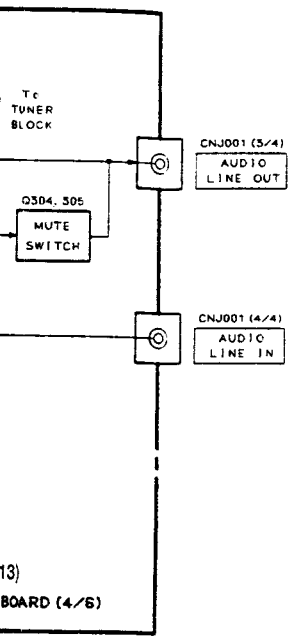

IC501 (42) REC/PB
4.5Vp-p
IC501 (2/2)
SYSTEM CONTROL
16MHz
D 5V
89 VDD
54 AVDD
53 AVREF
42 XTAL
X501 16MHz
43 EXTAL
87 TX
X502 32.768kHz
86 TEXL
S401 REC PROOF
78 REC SAF
IC291
REMOTE CONTROL RECEIVER
65 RMC
IC410
CAM MOTOR DRIVE
M903 CAM
CN410
VREF 4
CAM M 6
CAM P 5
VCC 7
31 LOAD CAM
91 CW
92 CAM
MTR 12V
S901
CAM ENCODER (MECHA POSITION)
CN415
58 MODE 1
57 MODE 2
56 MODE 3
55 MODE 4
IC407 (1/2)
TAPE END DETECT
Q125 TAKE UP END SENSOR
REF 2.5V
16 T SENS
15 S SENS
Q126 SUPPLY END SENSOR
+6V
TAPE LED D407
37 END LED
Q127 LED DRIVE
IC407 (2/2)
REEL FG AMP
T REEL FG
S REEL FG
REF 2.5V
64 T REEL FG
63 S REEL FG
D6V
D503
D502
IC507
POWER FAIL DET
RESET PULSE GENERATOR
11 POWER FAIL
40 COSMO RESET
EXP SO 80
EXP CLK 81
DEF 23
HEAD CONT 17
REC P 5
RF ENV 60
SP 10
ENV CONT 49
JOG 71
V PB 100
E TAPE 82
RENTAL 4
ORC ON 9
QVD 2
QHD ENABLE 3
D501
V SYNC 66
H DET 65
AFT 61
REC 6
LINE 1 18
NA PB 94
OSD ENABLE 38
NA REC P 13
A MUTE 95
TV/VTR 99
TU DATA 25
TU CLK 24
TU ENABLE 26
BG/DK 83
SYS RESET 97
LCD CS 98
COSMO S CLK 47
COSMO SO 46
COSMO SI 45
EEP RESET 32
EEPR CS 33
R/B 77
IC504
EEP ROM
SLV-E150EE
Q501
+6V
SWITCH
CN801
5 REC CUR
6 HEAD CONT
11 REC P
10 ENV
12 SP
3 ENV CONT
To/FROM VIDEO BLOCK
Q504
SWITCH
CN802 (3/3)
16 JOG
9 V PB
8 E TAPE
5 RENTAL
6 ORC ON
10 QVD
C SYNC
SYNC DET
AFT
REC
LINE 1
NA PB
CS
SYS RST
S CLK
S IN
To/FROM VIDEO BLOCK
NA PB
LINE 1
SP
NA REC P
MUTE
To/FROM AUDIO BLOCK
TU MUTE
PLL DATA
PLL CLK
PLL ENABLE
BG/DK
To/FROM TUNER BLOCK
SYS RESET
CBC CS
COSMO S CLK
COSMO SO
COSMO SI
To/FROM MODE CONTROL BLOCK
D6V
IC501 (66) REC/PB
2V/div
20usec/div
4.0Vp-p

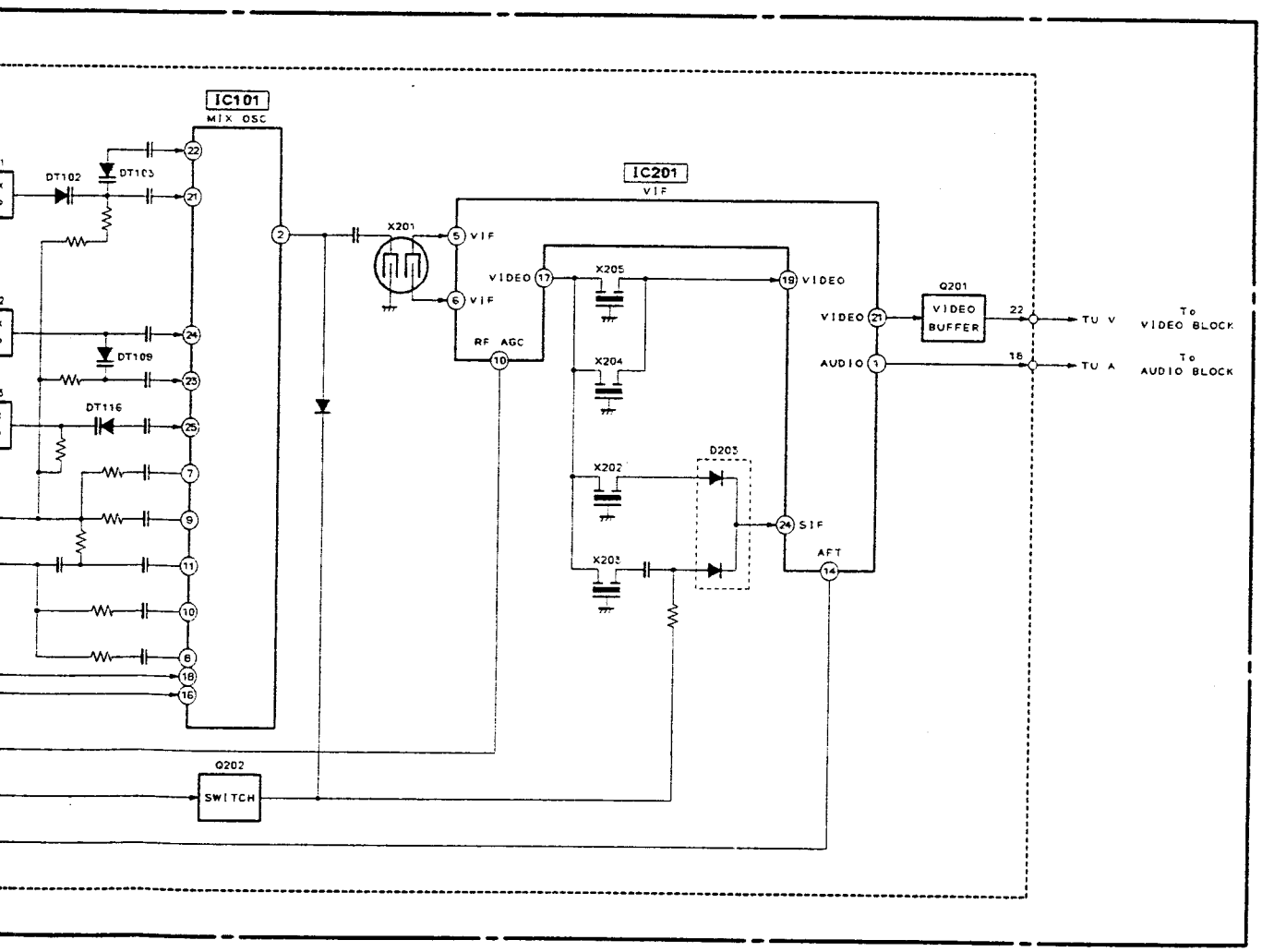
3-4. AUDIO BLOCK DIAGRAM

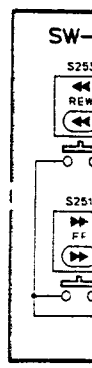


3-5. TUNER BLOCK DIAGRAM



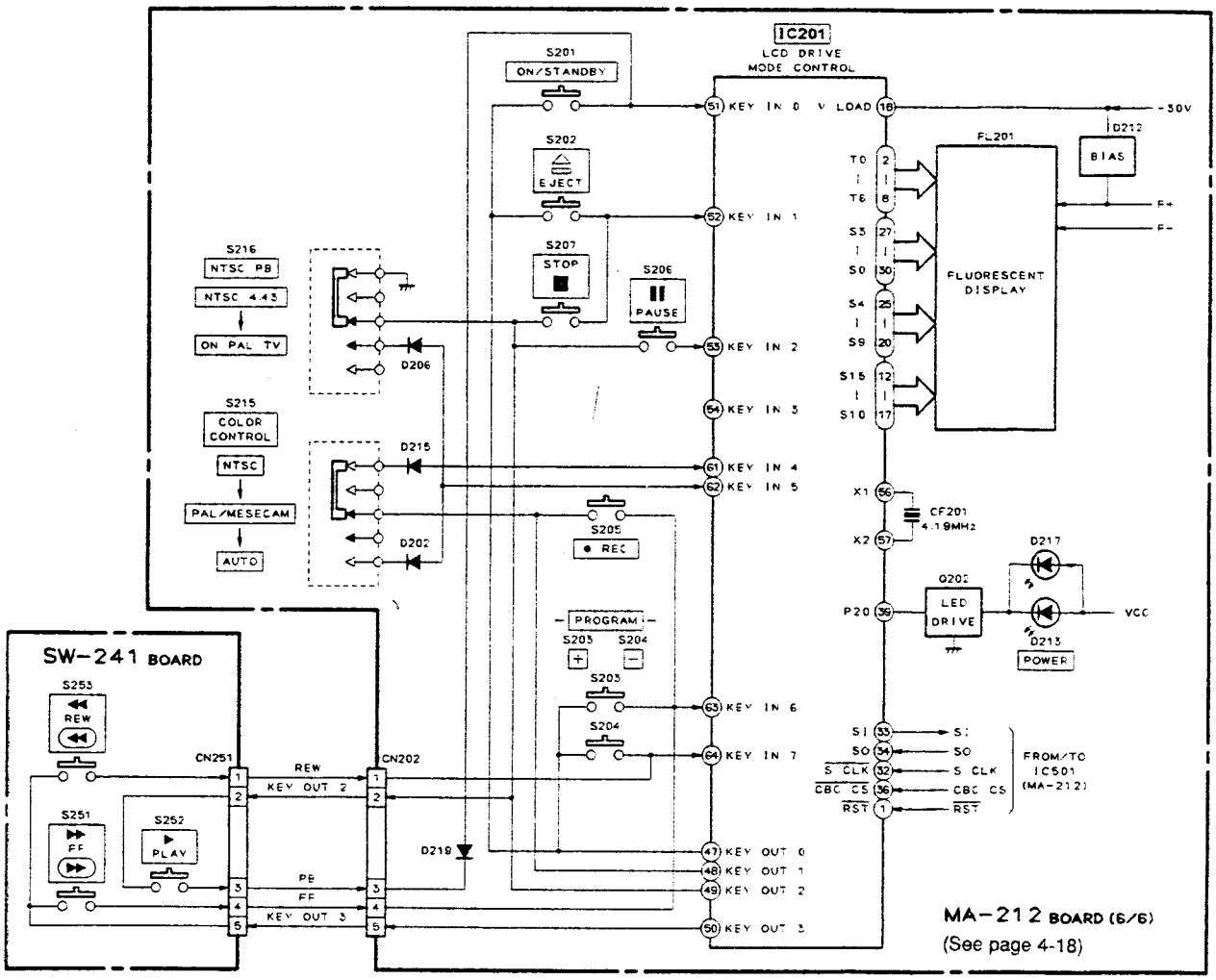

To
TUNER
BLOCK
CNJ001 (3/4)
AUDIO
LINE OUT
Q304, 305
MUTE
SWITCH
CNJ001 (4/4)
AUDIO
LINE IN
13)
BOARD (4/6)


IC101
MIX OSC
IC201
VIF
X201
VIF
VIDEO
RF AGC
X205
X204
X202
X203
D203
SIF
AFT
Q201
VIDEO
BUFFER
TU V
To
VIDEO BLOCK
TU A
To
AUDIO BLOCK
Q202
SWITCH
DT102
DT103
DT109
DT116


SW-

(See pag

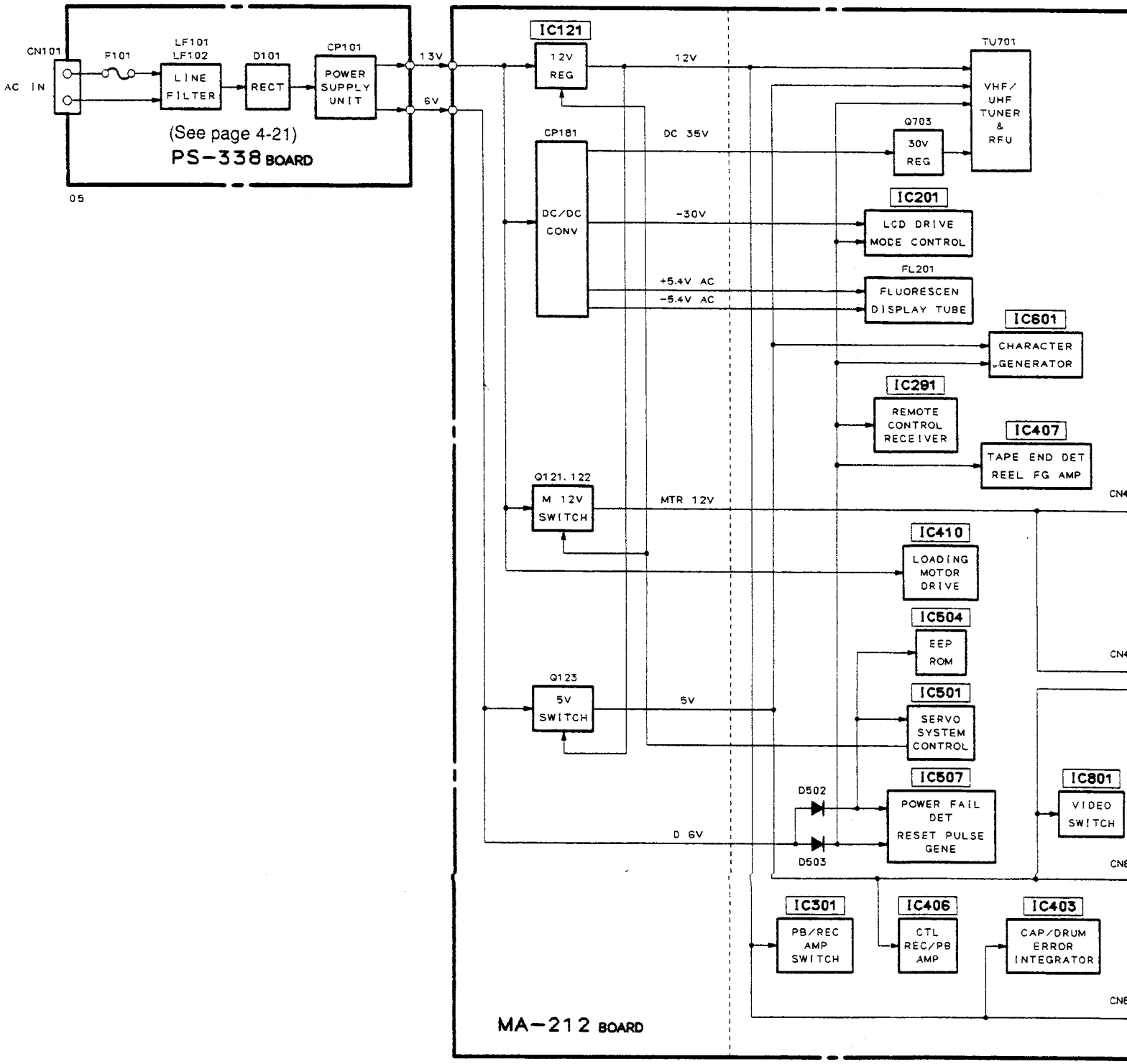
3-6. MODE CONTROL BLOCK DIAGRAM

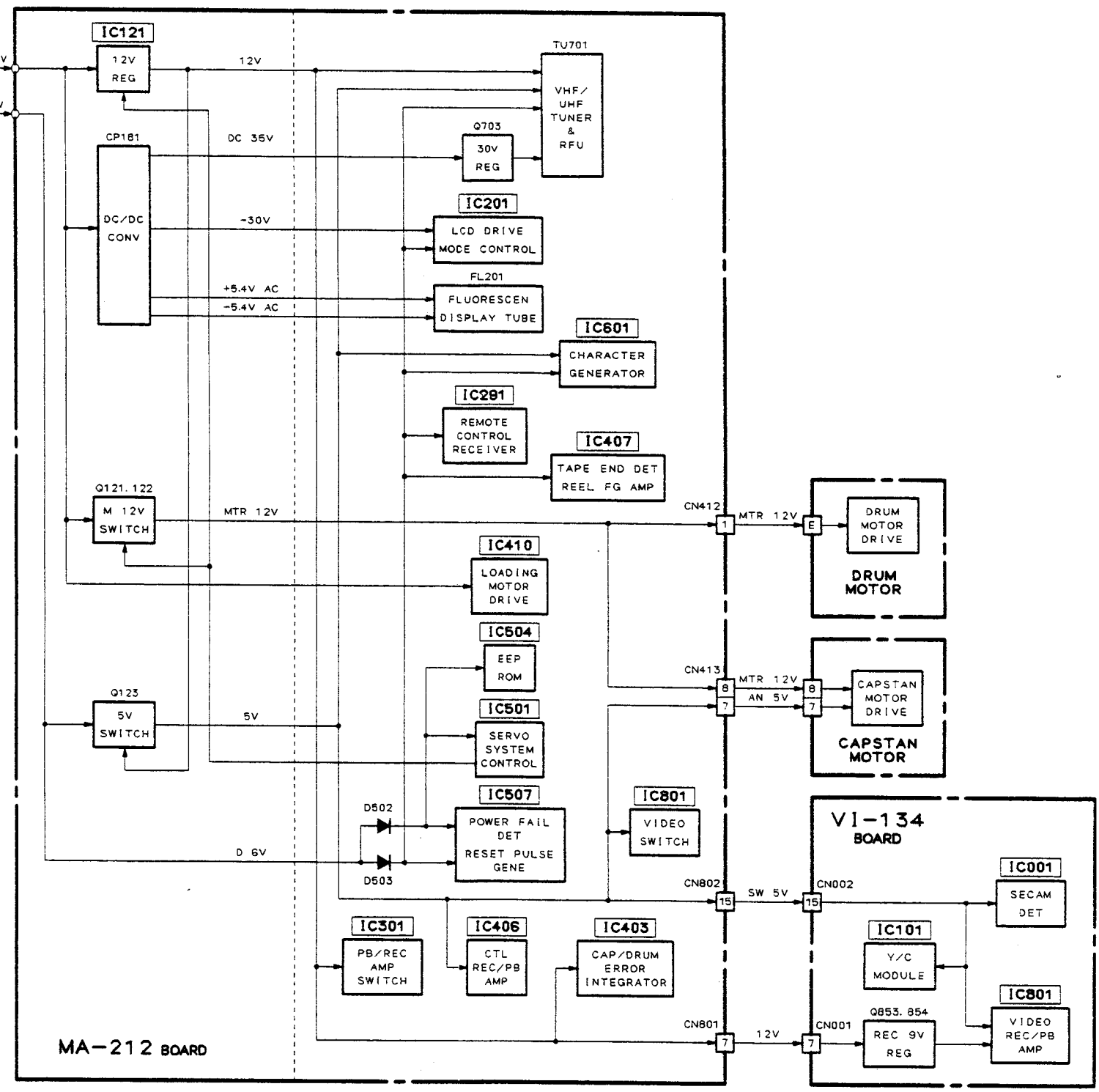


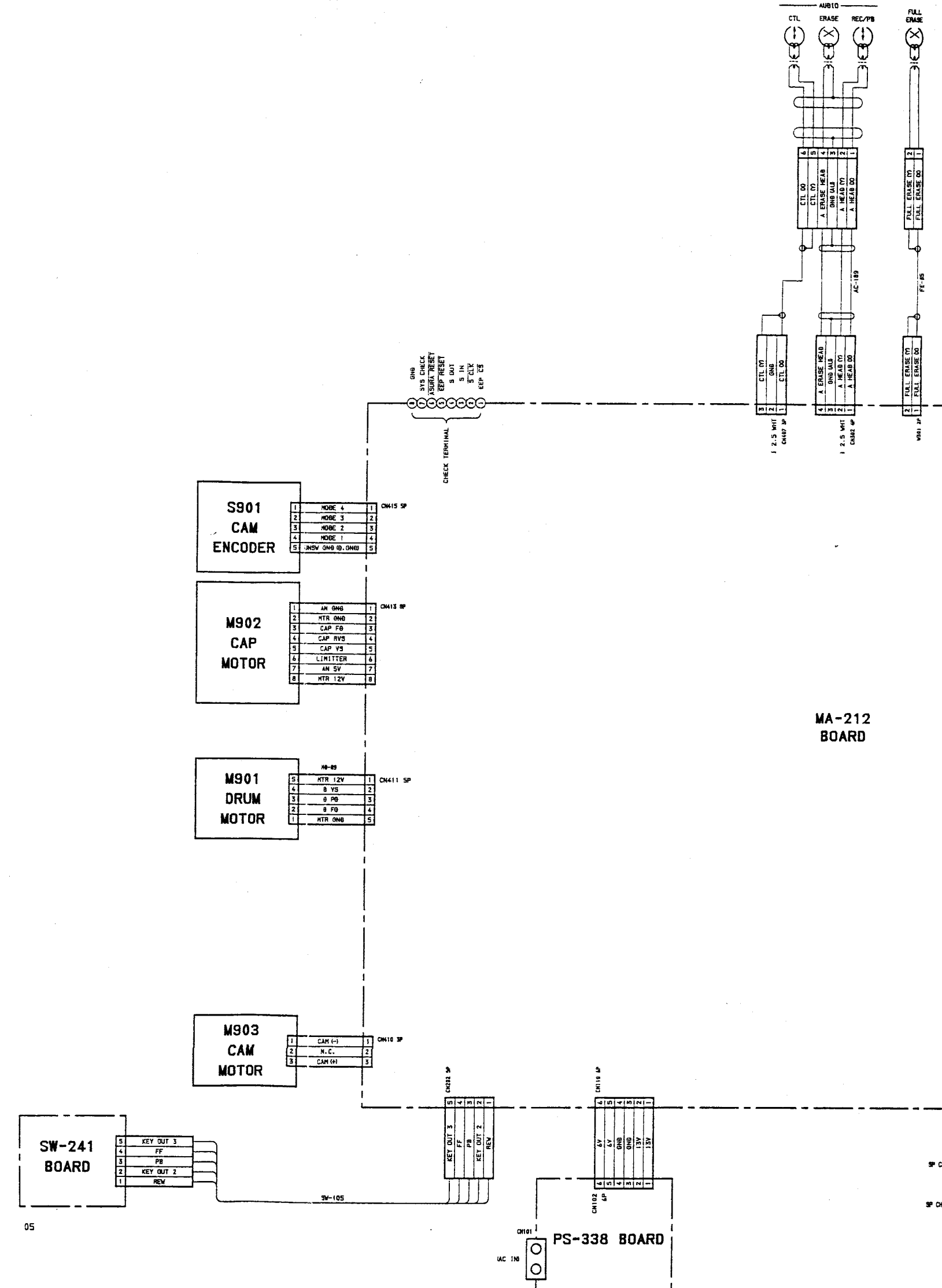
To VIDEO BLOCK

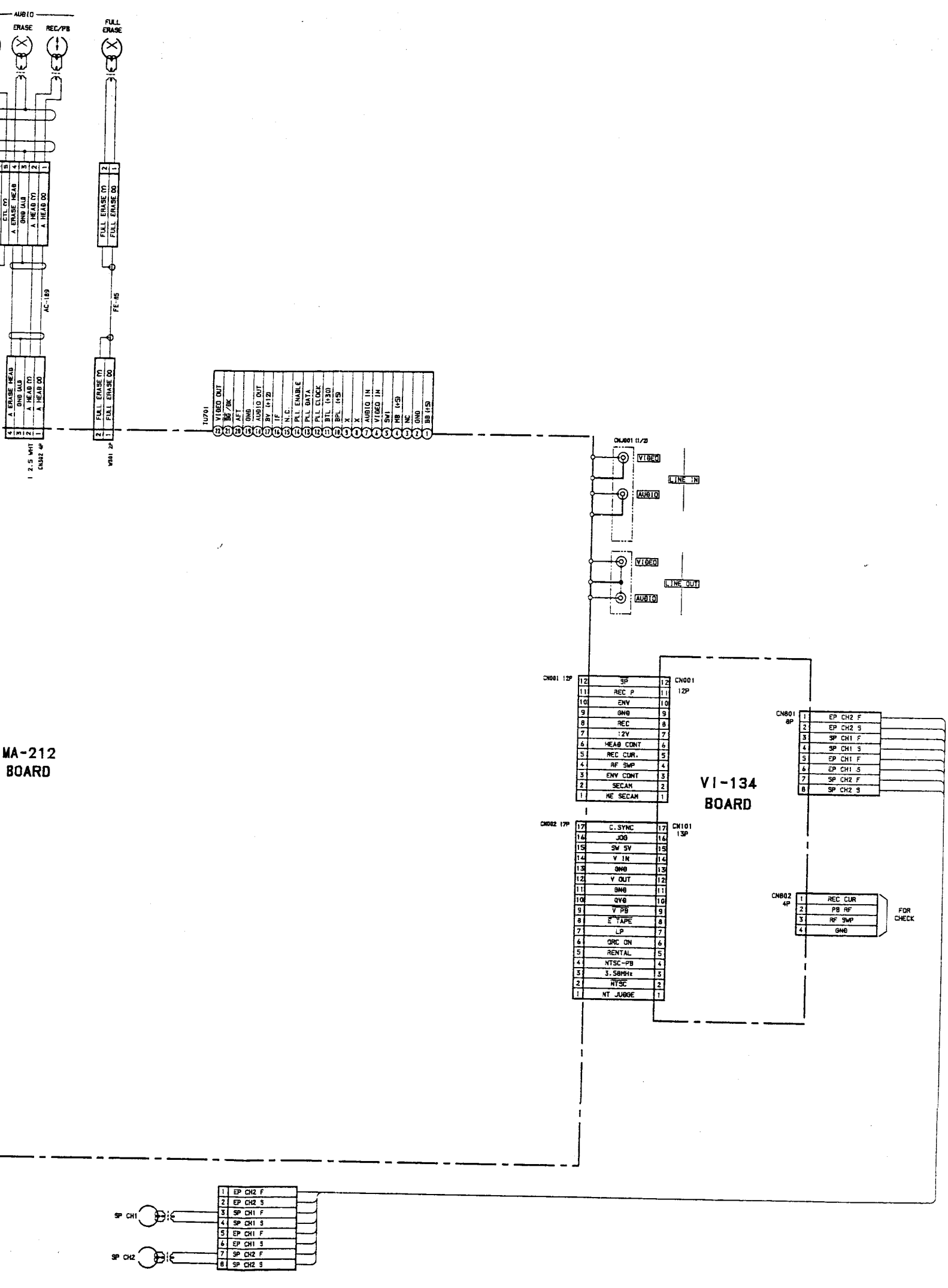
To AUDIO BLOCK

3-7. POWER SUPPLY BLOCK DIAGRAM

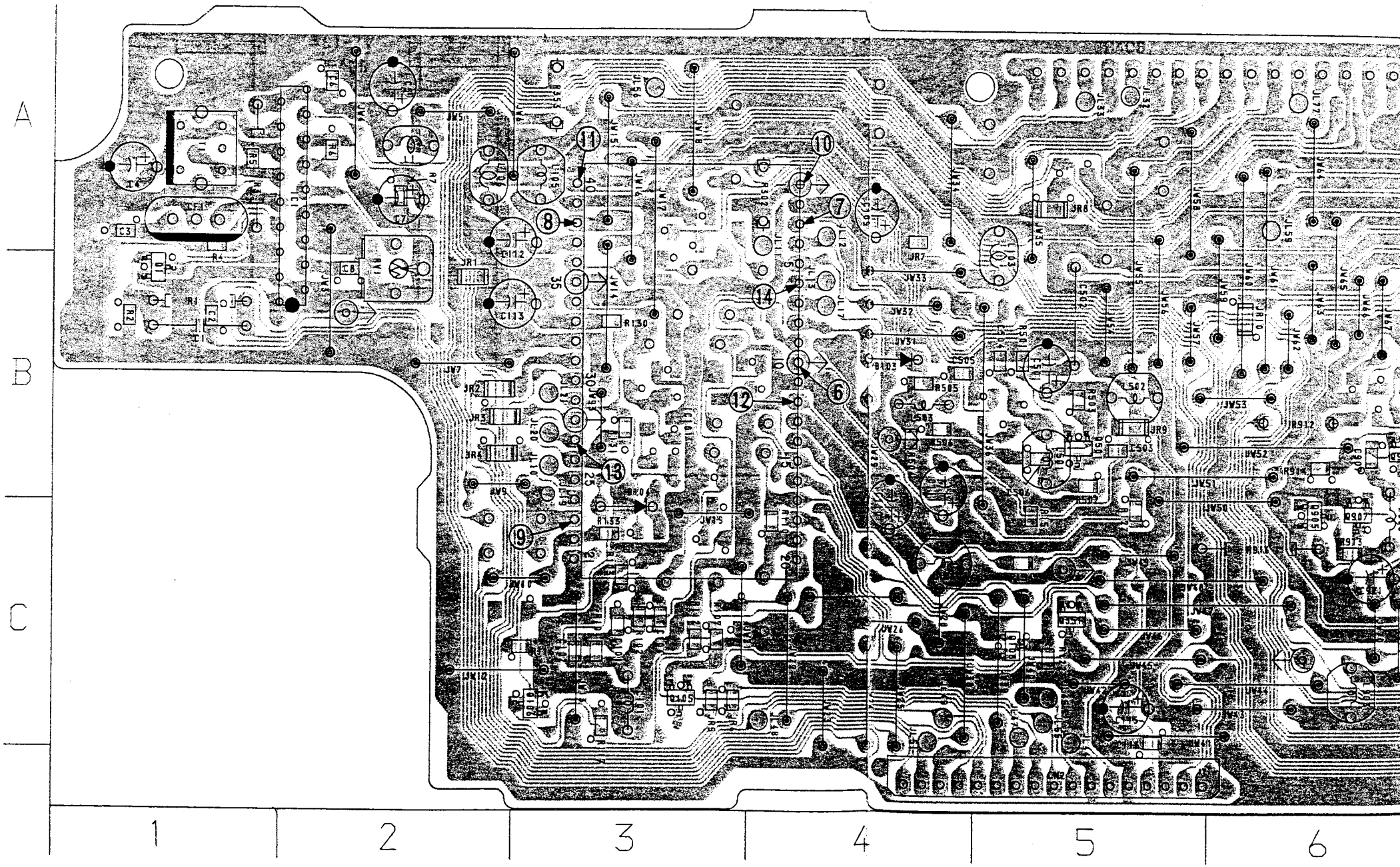


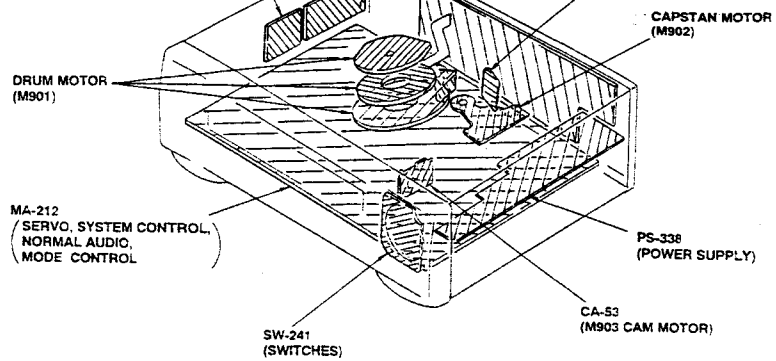

IC121
12V REG
12V
TU701
VHF/ UHF TUNER & RFU
Q703
30V REG
CP181
DC 35V
DC/DC CONV
-30V
IC201
LCD DRIVE MODE CONTROL
FL201
+5.4V AC
-5.4V AC
FLUORESCEN DISPLAY TUBE
IC601
CHARACTER GENERATOR
IC291
REMOTE CONTROL RECEIVER
IC407
TAPE END DET REEL FG AMP
Q121. 122
M 12V SWITCH
MTR 12V
CN412
1
MTR 12V
E
DRUM MOTOR DRIVE
DRUM MOTOR
IC410
LOADING MOTOR DRIVE
IC504
EEP ROM
CN413
8
7
MTR 12V
AN 5V
8
7
CAPSTAN MOTOR DRIVE
CAPSTAN MOTOR
Q123
5V SWITCH
5V
IC501
SERVO SYSTEM CONTROL
IC507
POWER FAIL DET
RESET PULSE GENE
D502
D503
D 6V
IC801
VIDEO SWITCH
VI-134 BOARD
CN802
15
SW 5V
CN002
15
IC001
SECAM DET
IC101
Y/C MODULE
IC801
VIDEO REC/PB AMP
IC301
PB/REC AMP SWITCH
IC406
CTL REC/PB AMP
IC403
CAP/DRUM ERROR INTEGRATOR
CN801
7
12V
CN001
7
Q853. 854
REC 9V REG
MA-212 BOARD


AUDIO
CTL
ERASE
REC/PB
FULL ERASE
CTL 00
CTL 01
A ERASE HEAD
GND (AUDIO)
A HEAD 01
A HEAD 00
FULL ERASE 01
FULL ERASE 00
AC-189
FE-85
GND
SYS CHECK
ASURA RESET
EEP RESET
S OUT
S IN
S CLK
EEP CS
CHECK TERMINAL
S901
CAM
ENCODER
MODE 4
MODE 3
MODE 2
MODE 1
(NSW GND @.GND)
CN415 5P
M902
CAP
MOTOR
AN GND
MTR GND
CAP FG
CAP RVS
CAP VS
LIMITTER
AN 5V
MTR 12V
CN413 8P
M901
DRUM
MOTOR
MTR 12V
D YS
D PG
D FG
MTR GND
CN411 5P
M903
CAM
MOTOR
CAM (-)
N.C.
CAM (+)
CN410 3P
MA-212
BOARD
SW-241
BOARD
KEY OUT 3
FF
PB
KEY OUT 2
REV
SW-105
CN203 5P
CN119 6P
6V
6V
GND
GND
13V
13V
CN102 6P
CN101
PS-338 BOARD
VAC IN
05


AUDIO
ERASE
REC/PB
FULL ERASE
CTL (Y)
A ERASE HEAD
GND (AUD)
A HEAD (Y)
A HEAD (G)
FULL ERASE (Y)
FULL ERASE (G)
AC-189
FE-115
2.5 WHT
CN302 4P
W301 2P
TU701
VIDEO OUT
B/W/BK
AFT
GND
AUDIO OUT
BV (+12)
IF
N.C.
PLL ENABLE
PLL DATA
PLL CLOCK
BTL (+30)
BPL (+5)
X
X
AUDIO IN
VIDEO IN
SW1
HB (+5)
NC
GND
BB (+5)
CN801 (1/2)
VIDEO
AUDIO
LINE IN
VIDEO
AUDIO
LINE OUT
CN001 12P
SP
REC P
ENV
GND
REC
12V
HEAD CONT
REC CUR.
RF SWP
ENV CONT
SECAM
ME SECAM
CN001 12P
CN802 17P
C.SYNC
JOG
SW 5V
V IN
GND
V OUT
GND
QV0
V PB
E TAPE
LP
ORC ON
RENTAL
NTSC-PB
3.58MHz
NTSC
NT JUDGE
CN101 13P
CN801 8P
EP CH2 F
EP CH2 S
SP CH1 F
SP CH1 S
EP CH1 F
EP CH1 S
SP CH2 F
SP CH2 S
CN802 4P
REC CUR
PB RF
RF SWP
GND
FOR CHECK
MA-212 BOARD
VI-134 BOARD
SP CH1
SP CH2
EP CH2 F
EP CH2 S
SP CH1 F
SP CH1 S
EP CH1 F
EP CH1 S
SP CH2 F
SP CH2 S

VI-134 BOARD





VI-134 BOARD

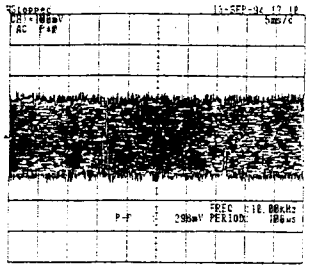
CN001	D-6
CN002	D-5
CN801	B-10
CN802	A-7
IC001	A-2
IC101	B-3
IC801	B-9
D103	B-4
D104	I-3
D802	C-10
D804	C-10
Q001	B-1
Q105	C-3
Q106	C-3
Q108	C-5
Q351	C-5
Q501	B-7
Q851	A-9
Q852	B-10
Q853	A-9
Q854	A-9
Q855	A-10
Q861	B-10
Q862	B-10
Q901	B-9
Q904	B-9
Q905	C-6
Q906	B-6
Q907	C-6

4-2. PRINTED WIRING BOARDS AND SCHEMATIC DIAGRAMS

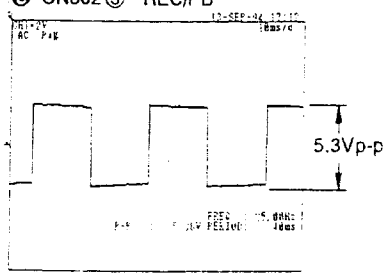
- Waveforms

VI-134 Board

❶ CN802 ① REC 0.1V/DIV 5ms/DIV

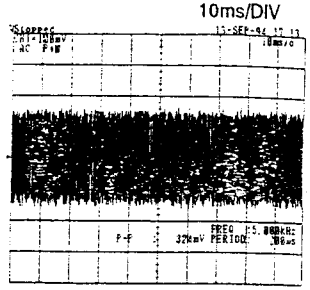


❸ CN802 ③ REC/PB

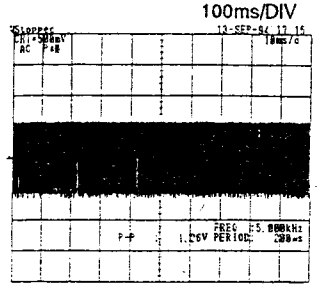


25Hz

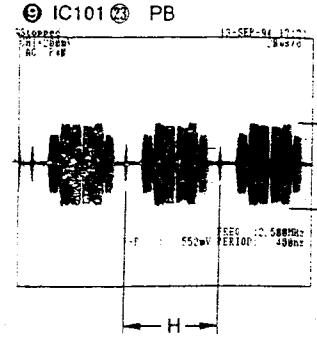
❺ IC801 ㉙ REC 0.1V/DIV 10ms/DIV



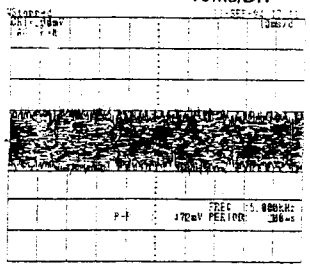
❼ IC101 ③ REC 0.5V/DIV 100ms/DIV



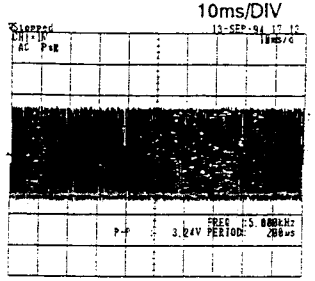
❾ IC101 ㉓ PB



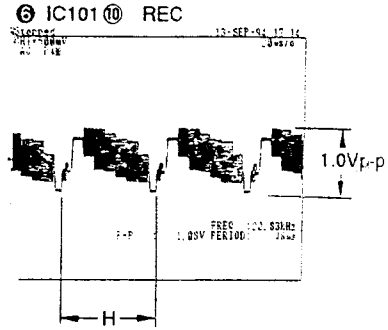
❷ CN802 ② PB 0.2V/DIV 10ms/DIV



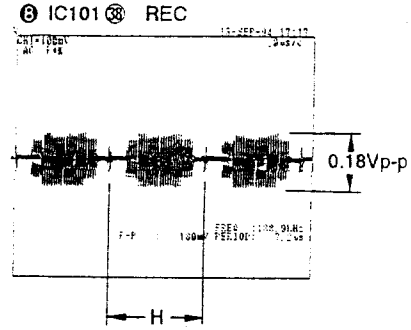
❹ IC801 ④ REC 1V/DIV 10ms/DIV



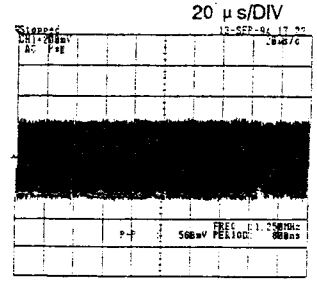
❻ IC101 ⑩ REC



❽ IC101 ㉘ REC

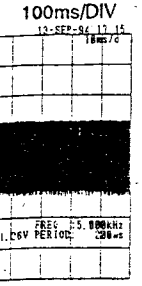


❿ IC101 ① PB 0.2V/DIV 20 µ s/DIV

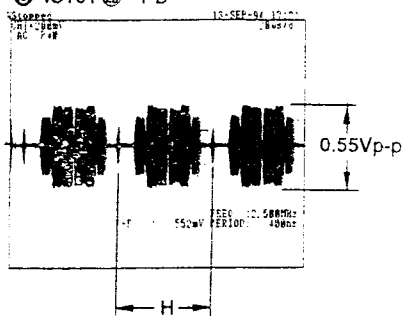


VI-134 (HEAD AMP, VIDEO) PRINTED WIRING BOARD
– Ref. No.: VI-134 Board; 1,000 series –

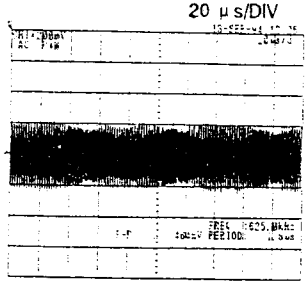
0.5V/DIV
100ms/DIV



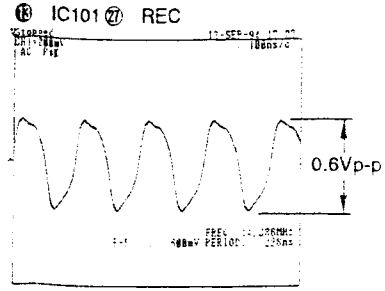
⑨ IC101 ㉓ PB



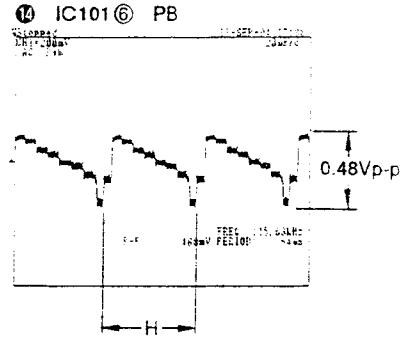
⑪ IC101 ㊵ PB 0.2V/DIV
20 μs/DIV

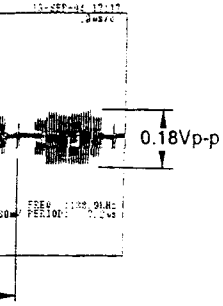


⑬ IC101 ㉗ REC

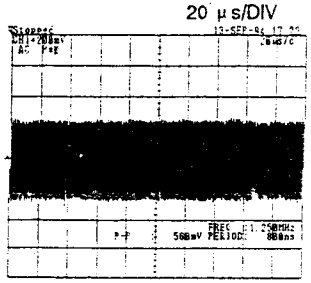


⑭ IC101 ⑥ PB

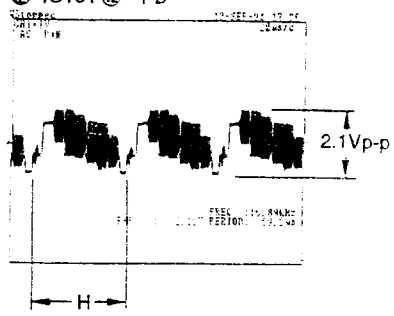




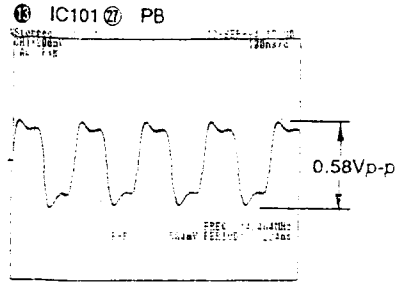
⑩ IC101 ① PB 0.2V/DIV
20 μs/DIV

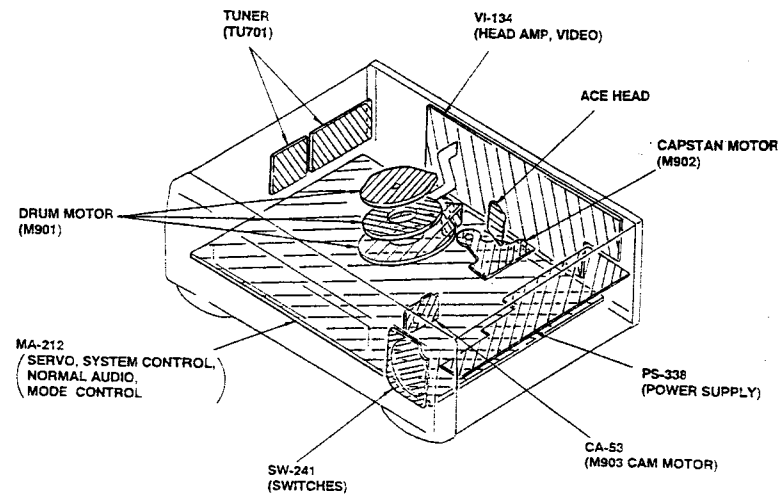


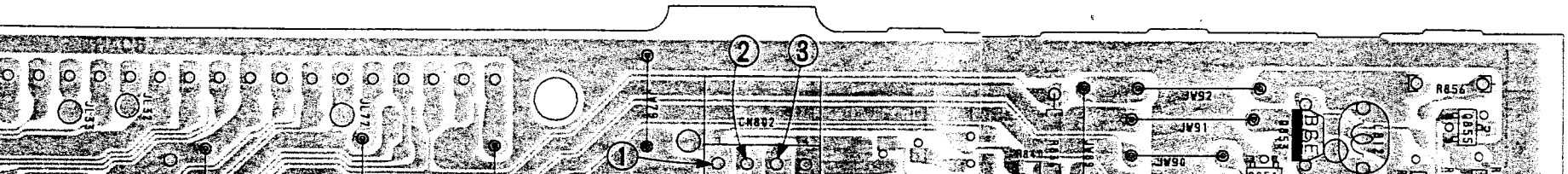
⑫ IC101 ⑫ PB



⑬ IC101 ㉗ PB

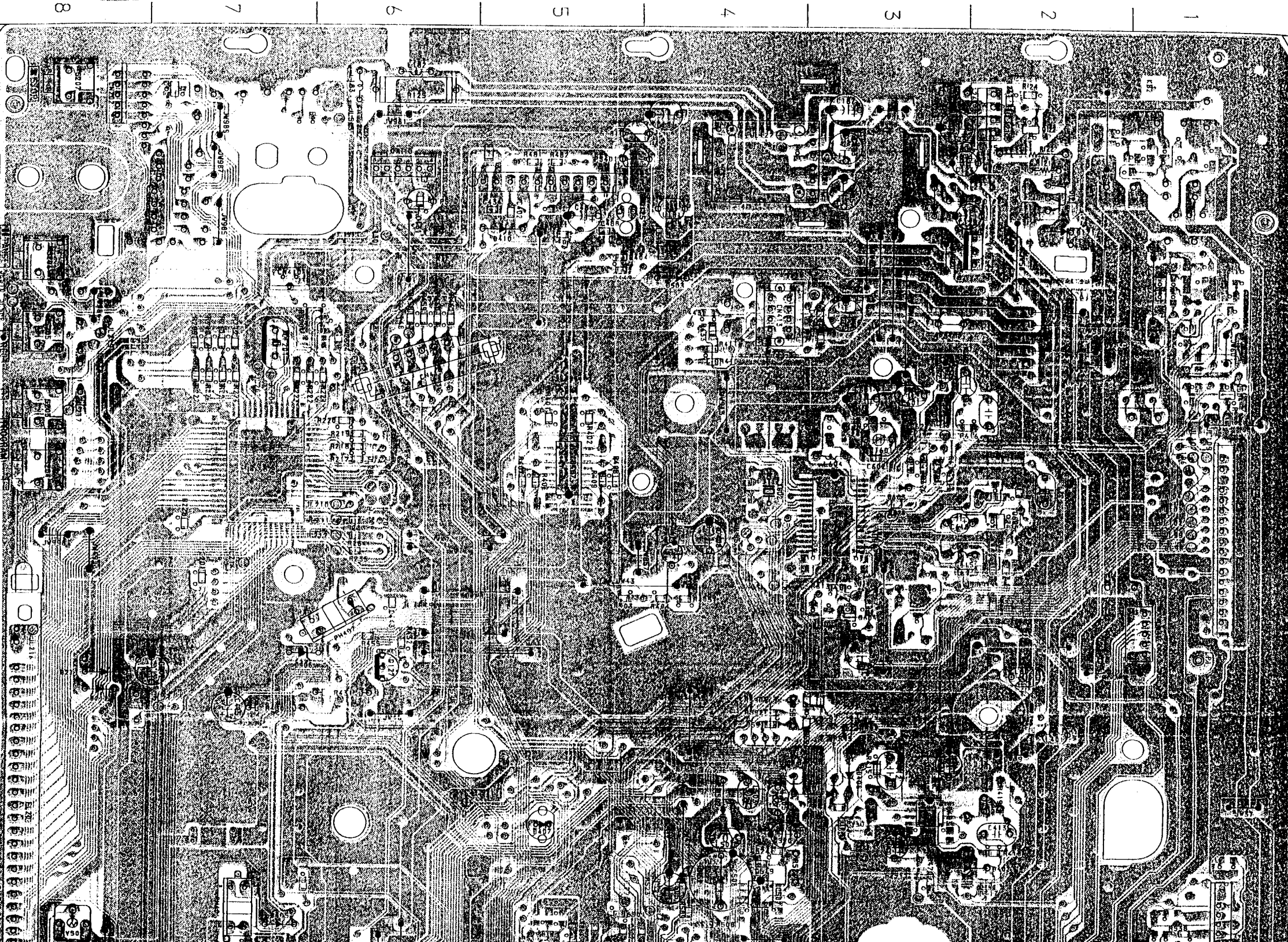


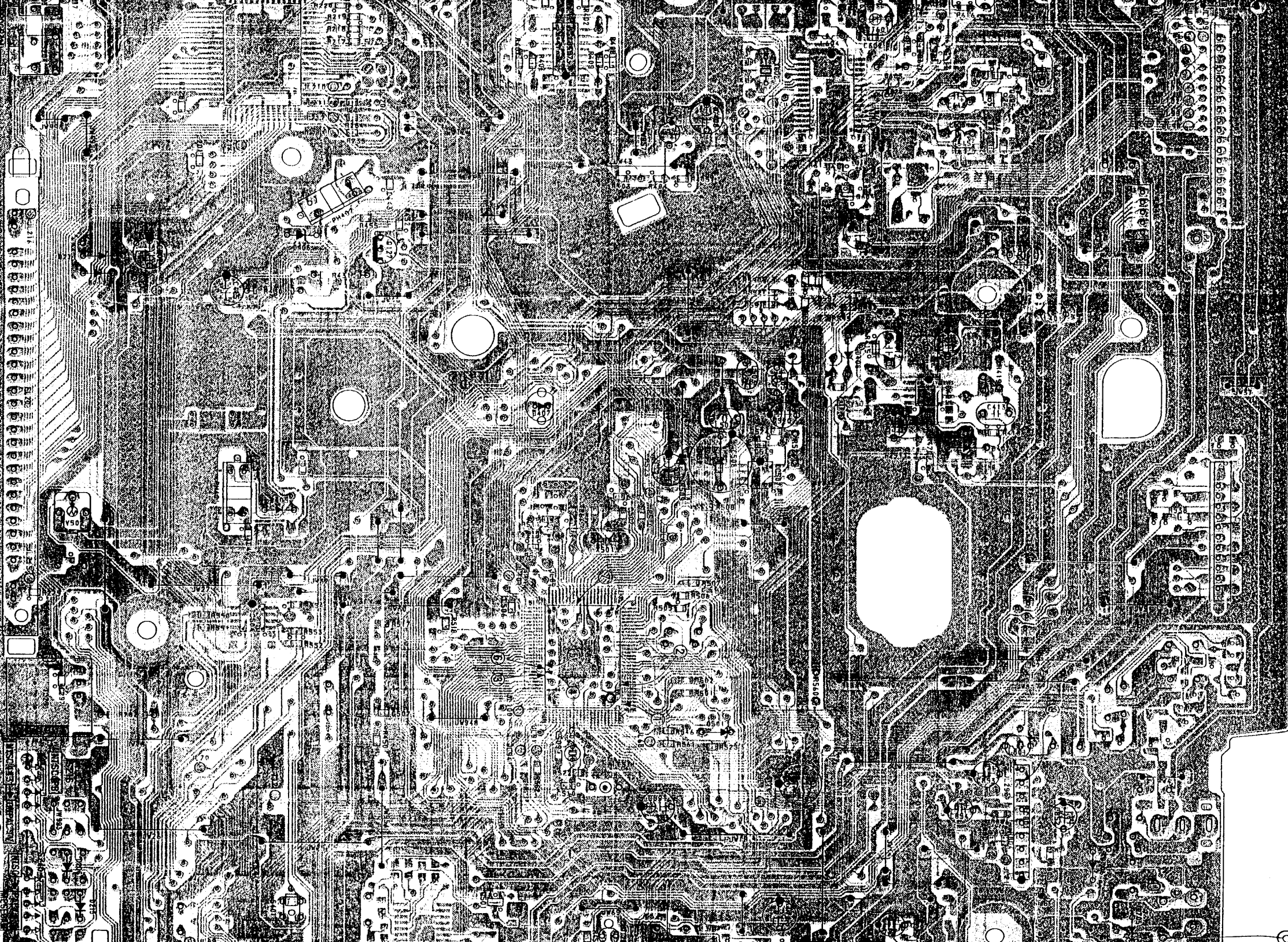


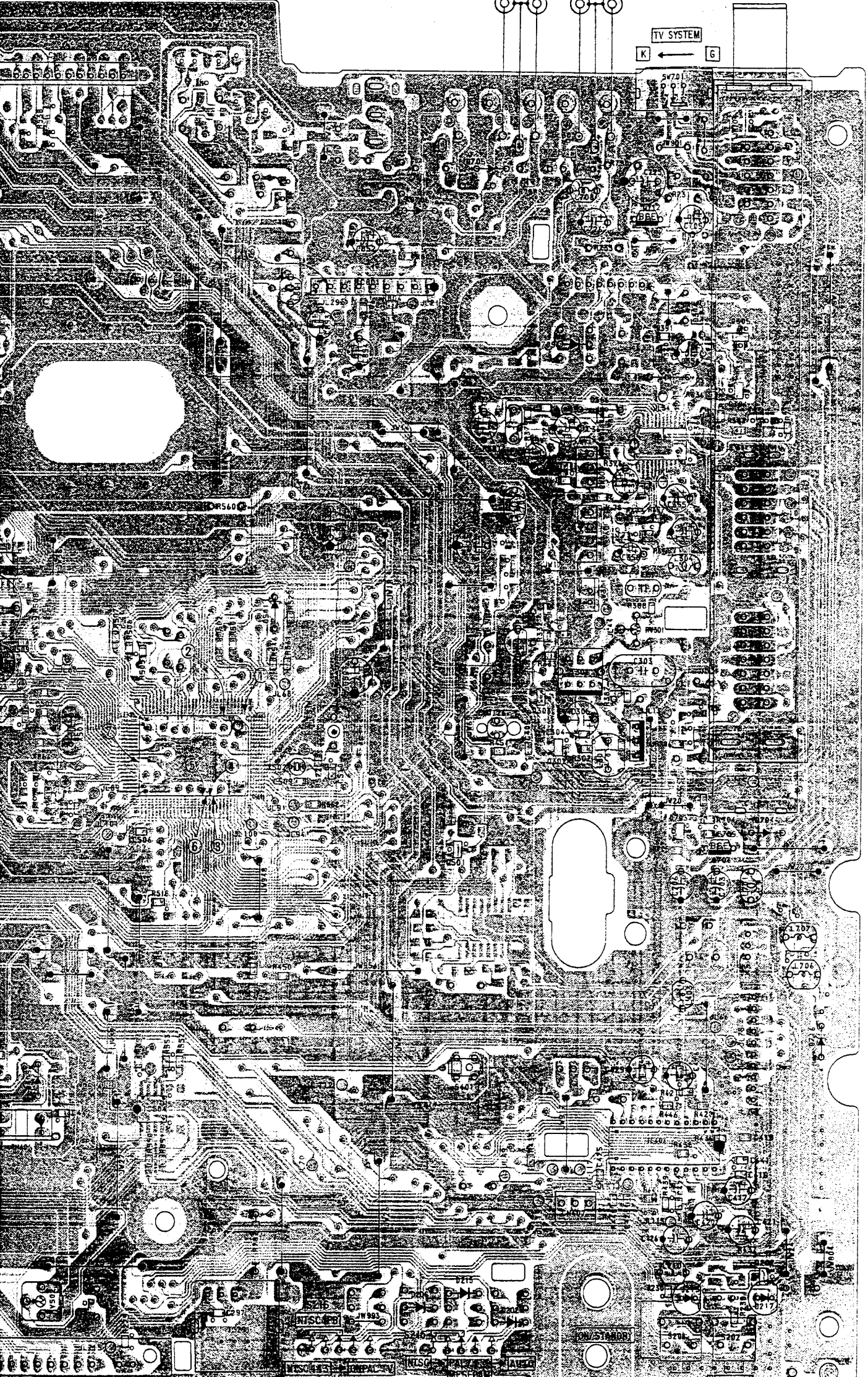


VI-134 BOARD

CN001	D-8
CN002	D-5
CN801	B-10
CN802	A-7
IC001	A-2
IC101	B-3


8
7
6
5
4
3
2
1

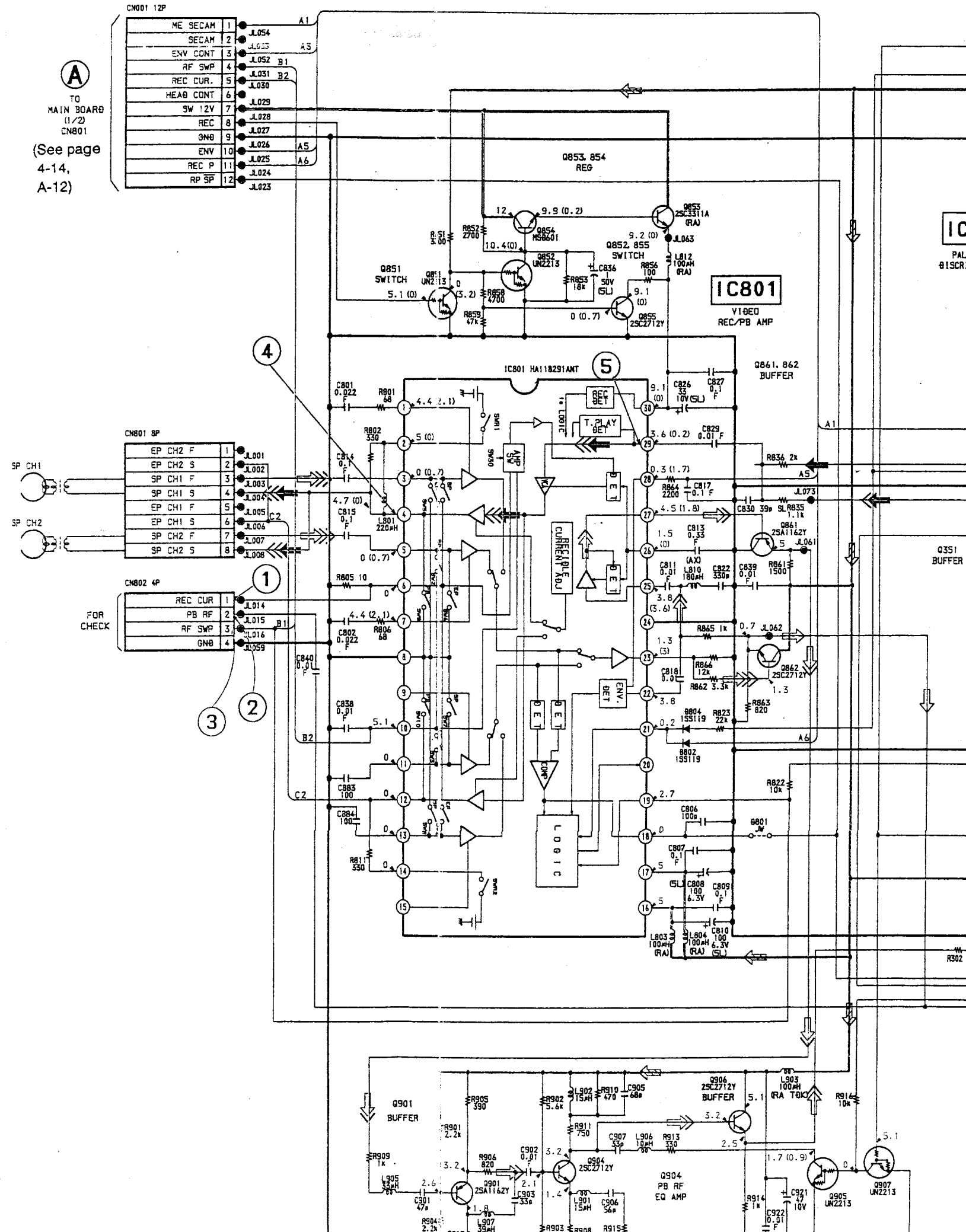




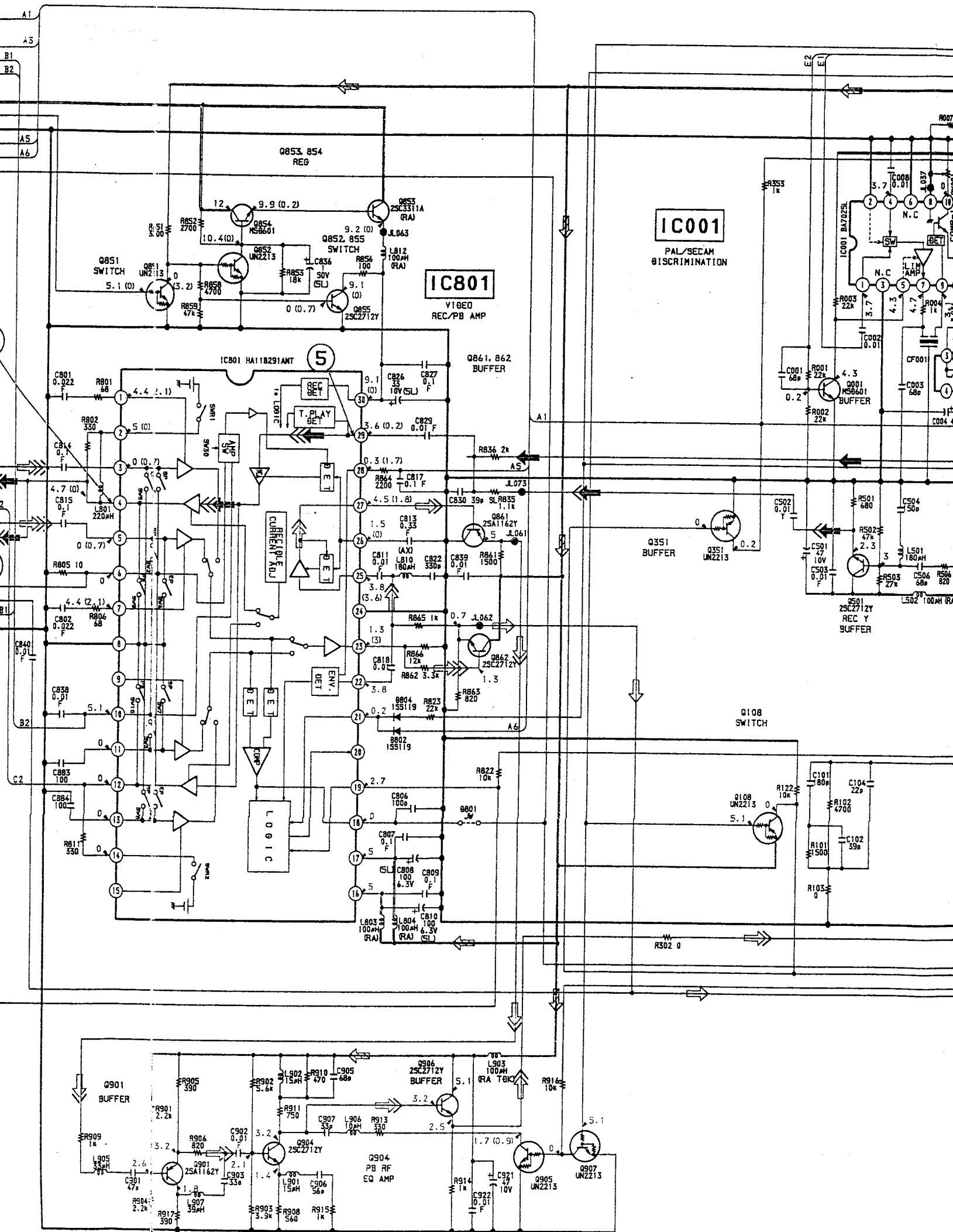
MA-212 BOARD

CN110	H-6
CN202	H-8
CN302	B-3
CN303	B-3
CN407	B-7
CN410	G-7
CN412	F-2
CN413	G-4
CN415	G-6
CN801	D-1
CN802	F-1
D121	H-2
D122	H-3
D123	H-3
D202	D-8
D206	D-8
D211	E-8
D212	E-8
D213	A-8
D215	D-8
D217	A-8
D219	H-7
D304	A-2
D401	E-3
D402	D-3
D405	D-7
D406	F-7
D407	E-5
D408	E-3
D410	H-5
D501	C-4
D502	E-4
D503	G-4
D603	F-3
D703	A-5
D704	A-5
D705	B-2
D706	C-2
D709	B-2
D716	A-6
IC121	H-2
IC201	F-7
IC291	C-8
IC301	A-3
IC403	E-3
IC406	A-7
IC407	F-5
IC410	H-5
IC501	D-5
IC504	D-7
IC507	D-4
IC601	F-3
IC801	C-2
Q121	H-2
Q122	H-2
Q123	G-2
Q125	H-5
Q126	B-5
Q127	E-6
Q202	A-8
Q301	B-5
Q302	B-5
Q303	B-5
Q304	A-3
Q305	A-3
Q501	B-5
Q504	G-1
Q604	F-3
Q605	F-2
Q703	A-5
Q712	B-2

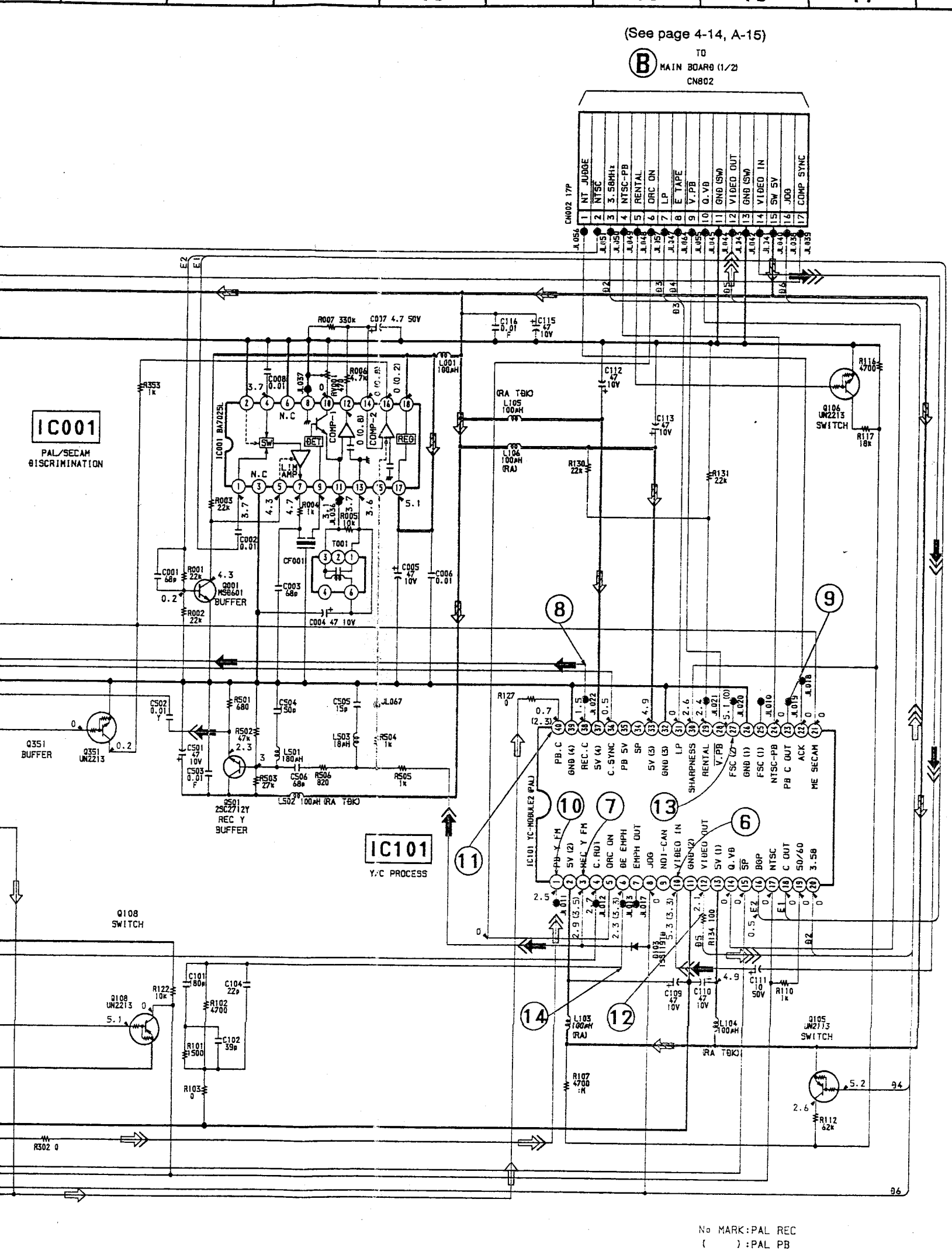
VI-134 BOARD (VIDEO SIGNAL PROCESS, REC PB AMP)

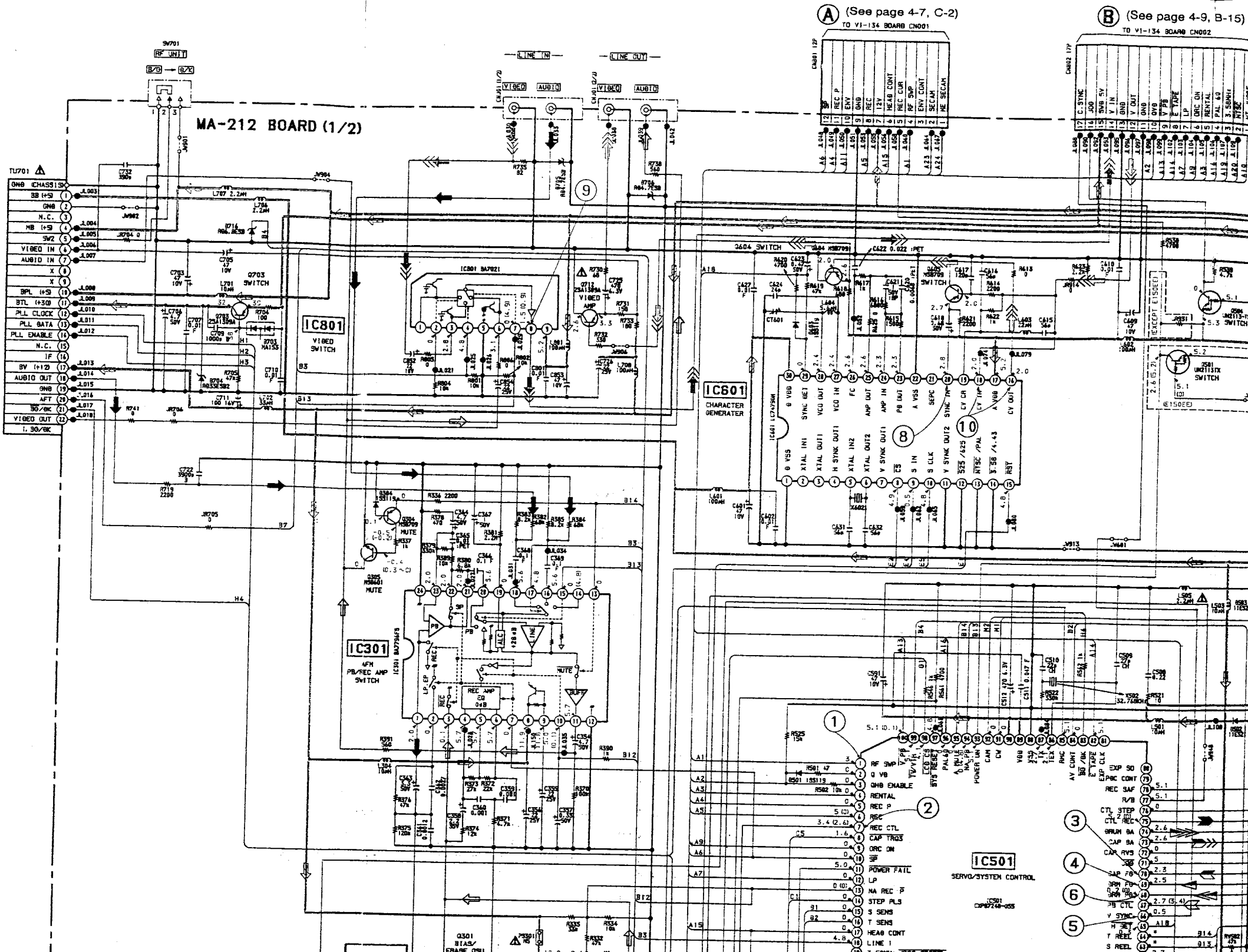


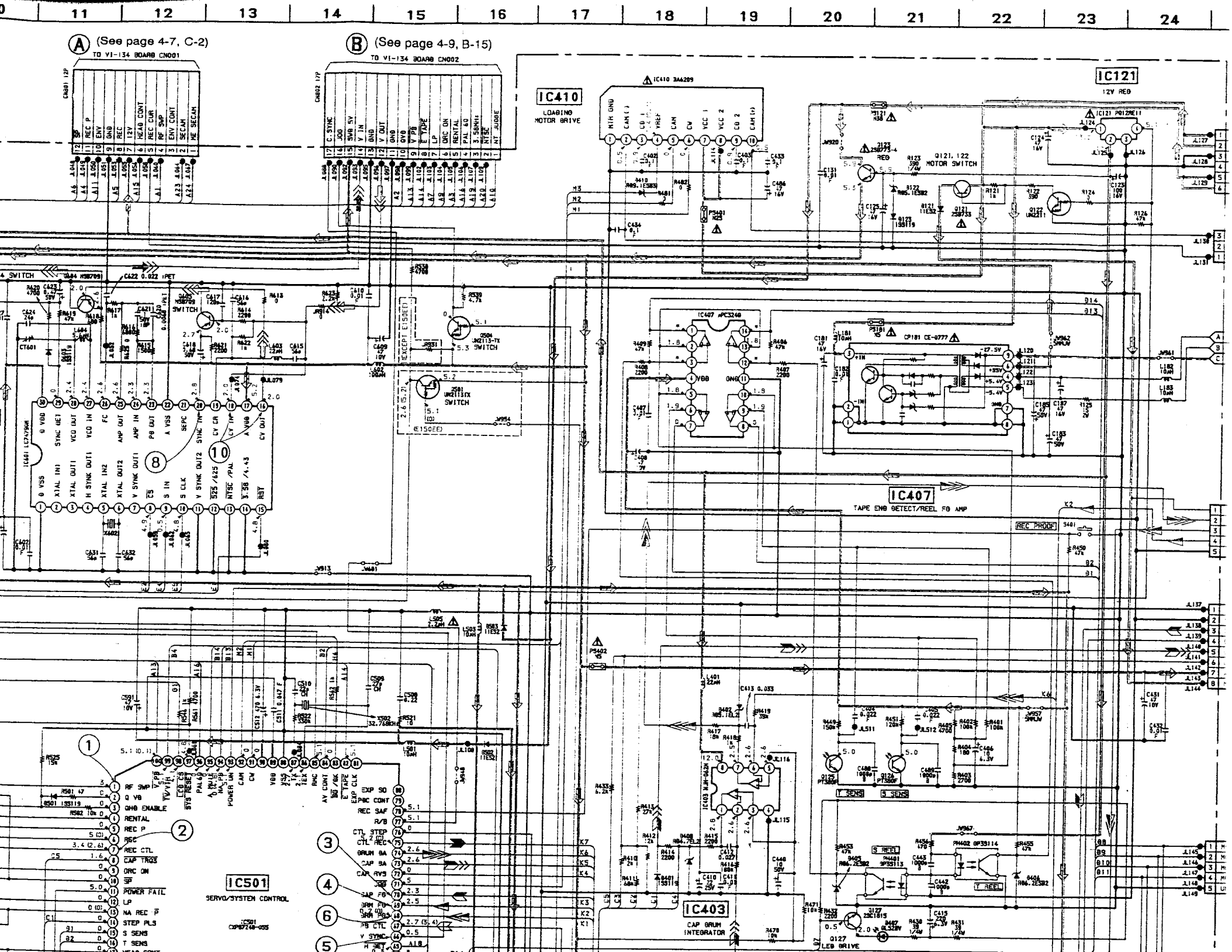
VI-134 BOARD (VIDEO SIGNAL PROCESS, REC PB AMP)

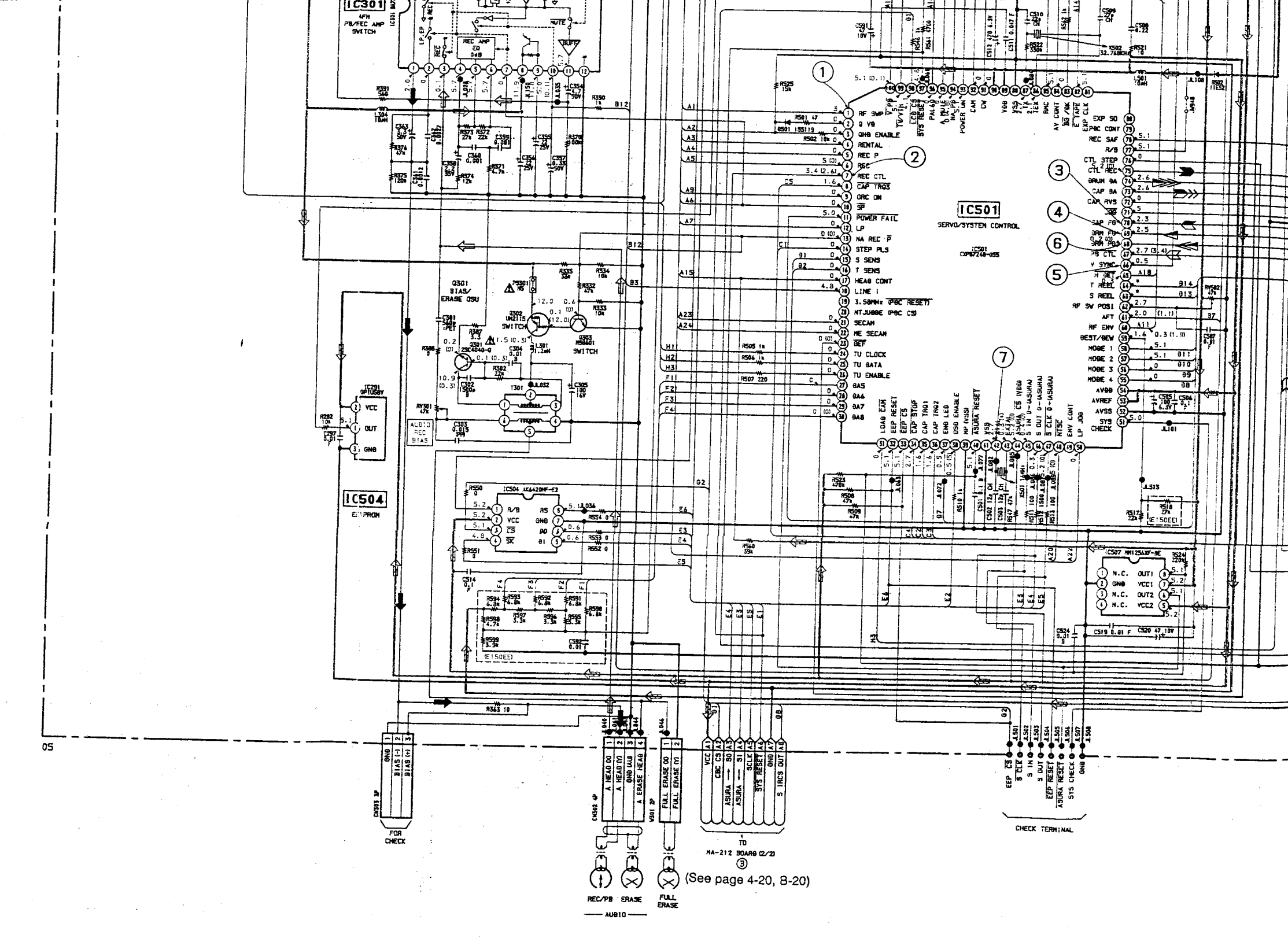


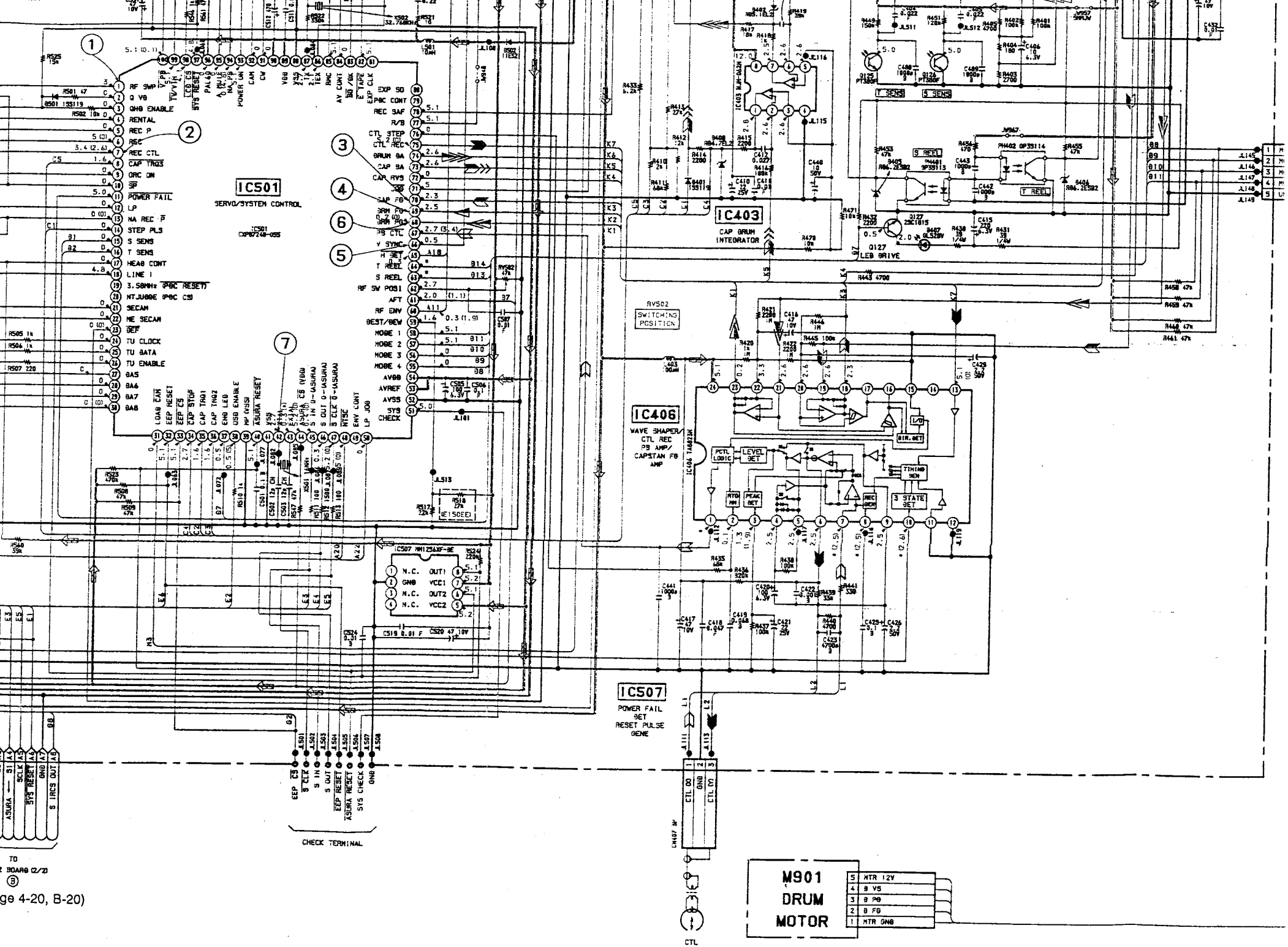
(See page 4-14, A-15)



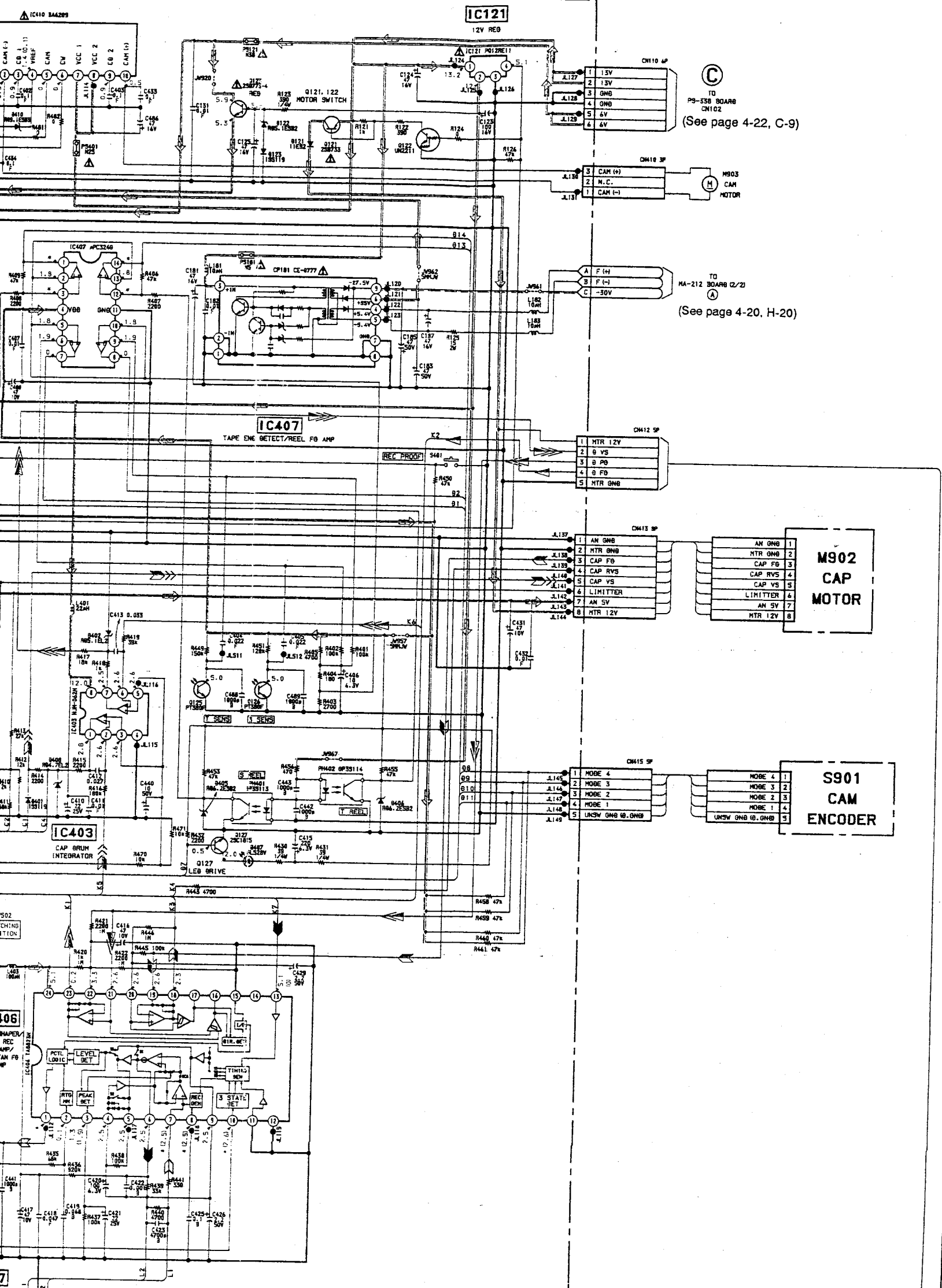

MA-212 BOARD (1/2)
A (See page 4-7, C-2)
TO VI-134 BOARD CN001
B (See page 4-9, B-15)
TO VI-134 BOARD CN002
IC801
VIDEO SWITCH
IC601
CHARACTER GENERATOR
IC301
4FM PB/REC AMP SWITCH
IC501
SERVO/SYSTEM CONTROL
Q703 SWITCH
Q604 SWITCH
Q501 BIAS/ERASE OSC
RF UNIT
LINE IN
LINE OUT
VIDEO
AUDIO


11
12
13
14
15
16
17
18
19
20
21
22
23
24
A (See page 4-7, C-2)
B (See page 4-9, B-15)
TO VI-134 BOARD CN001
TO VI-134 BOARD CN002
IC410
LOADING MOTOR DRIVE
IC121
12V REG
IC407
TAPE END DETECT/REEL FG AMP
IC501
SERVO/SYSTEM CONTROL
IC403
CAP DRUM INTEGRATOR
Q121, 122
MOTOR SWITCH
REC PROOF
T SENS
S SENS
S REEL
T REEL
LED DRIVE


IC301
AFM PB/REC AMP SWITCH
IC501
SERVO/SYSTEM CONTROL
IC504
EEPROM
Q301 BIAS/ ERASE OSC
Q302 SWITCH
Q303 SWITCH
AUDIO REC BIAS
FOR CHECK
TO MA-212 BOARD (2/2) (B)
CHECK TERMINAL
REC/PB ERASE
FULL ERASE
AUDIO
(See page 4-20, B-20)


IC501
SERVO/SYSTEM CONTROL
IC403
CAP DRUM INTEGRATOR
IC406
WAVE SHAPER/ CTL REC PB AMP/ CAPSTAN FG AMP
IC507
POWER FAIL RESET PULSE GENE
M901
DRUM MOTOR
CHECK TERMINAL
CTL
SWITCHING POSITION
T REEL
S REEL
T SENS
S SENS
LOAD CAN
EEP RESET
EEP CS
CAP STOP
CAP TAQ1
CAP TAQ2
ENG LED
USD ENABLE
MP VSSI
ASURA RESET
ENV CONT
LP JOG
S CLK
S IN
S OUT
SYS CHECK
GND
CTL
DRUM MOTOR
MTR 12V
9 VS
9 PG
9 FG
MTR GND

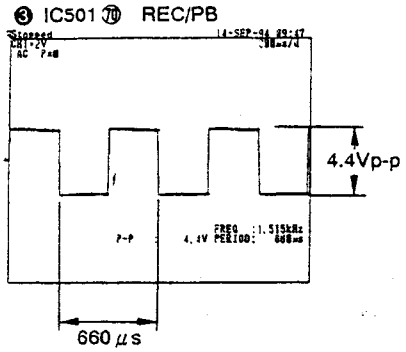
ge 4-20, B-20)


IC121
12V REG
CN110 4P
1 15V
2 13V
3 GND
4 GND
5 6V
6 6V
TO PS-338 BOARD CN102
(See page 4-22, C-9)
CN410 3P
3 CAM (+)
2 N.C.
1 CAM (-)
M903 CAM MOTOR
Q121, 122 MOTOR SWITCH
IC407 APC3240
CP181 CE-4777
CN412 5P
1 MTR 12V
2 Θ VS
3 Θ PG
4 Θ FG
5 MTR GND
TO MA-212 BOARD (2/2)
A F (+)
B F (-)
C -30V
(See page 4-20, H-20)
IC407
TAPE END DETECT/REEL FG AMP
REC PROOF
CN413 8P
1 AN GND
2 MTR GND
3 CAP FG
4 CAP RVS
5 CAP VS
6 LIMITTER
7 AN 5V
8 MTR 12V
M902 CAP MOTOR
CN415 5P
1 MODE 4
2 MODE 3
3 MODE 2
4 MODE 1
5 UNSW GND (0.GND)
S901 CAM ENCODER
IC403
CAP DRUM INTEGRATOR
Q127
LEAD DRIVE
T SENS
S SENS
S REEL
T REEL
PCTL LOGIC
LEVEL DET
PEAK DET
REC GEN
3 STATE DET
TIMING GEN

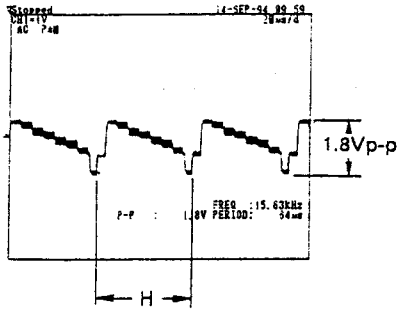
25Hz

16MHz

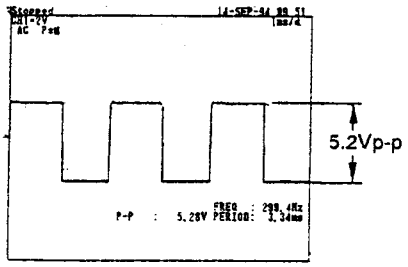
❸ IC501 ⑦⓪ REC/PB



❽ IC601 ⑳ REC/PB

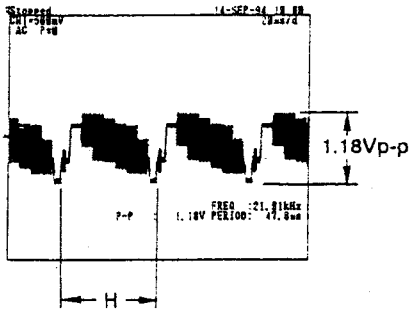


❹ IC501 ⑥⑨ REC/PB

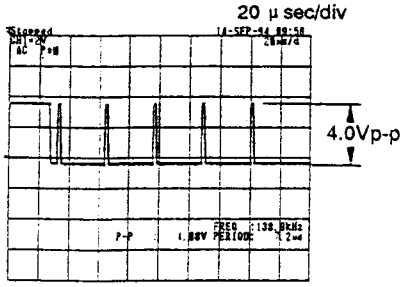


300Hz

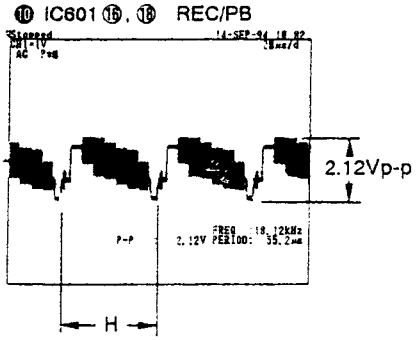
❾ IC801 ⑧ REC



❺ IC501 ⑥⑥ REC/PB 2V/div
20 μ sec/div



❿ IC601 ⑮, ⑱ REC/PB



- Signal path

	VIDEO SIGNAL	AUDIO
	Y/CHROMA	SIGNAL
REC	➡⋙	➡
PB	⇨⋙	⇨

- Signal path

	REC	REC/PB	PB
Drum speed servo		▷	
Drum phase servo		▷▷	
Drum servo (speed and phase)		▷⋙	
Capstan speed servo		▱	
Capstan phase servo	▰»	▱»	▱»
Capstan servo (speed and phase)		▱⋙	
Ref. signal	▰		▱

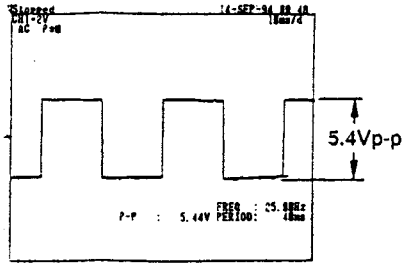
28 | 29

A B C D E F G H I J K L M N

• Waveforms

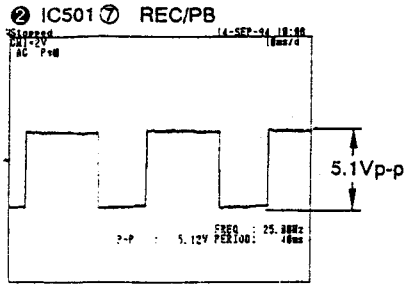
MA-212 Board

❶ IC501 ① REC/PB



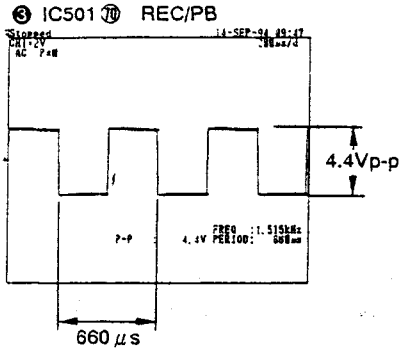
25Hz

❷ IC501 ⑦ REC/PB

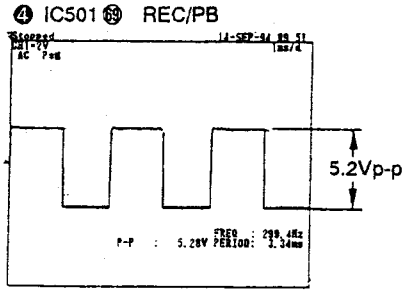


25Hz

❸ IC501 ⑩ REC/PB

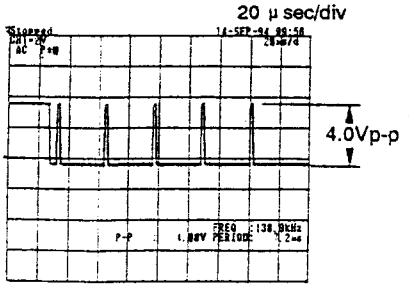


❹ IC501 ⑲ REC/PB

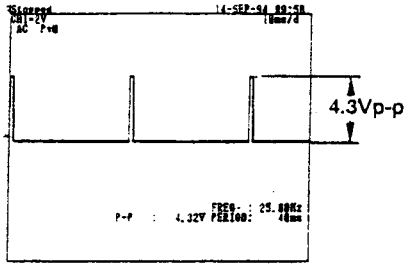


300Hz

❺ IC501 ⑱ REC/PB 2V/div
20 μ sec/div

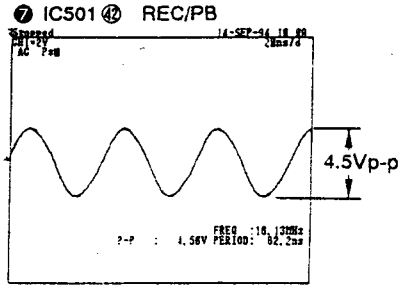


❻ IC501 ⑱ REC/PB



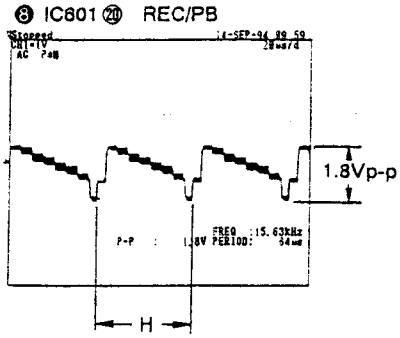
25Hz

❼ IC501 ㊷ REC/PB

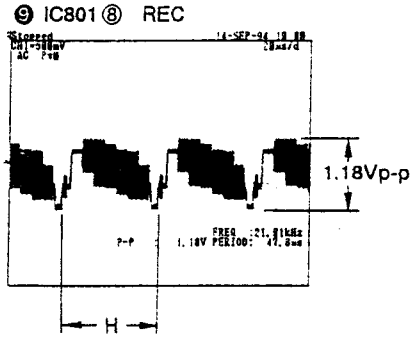


16MHz

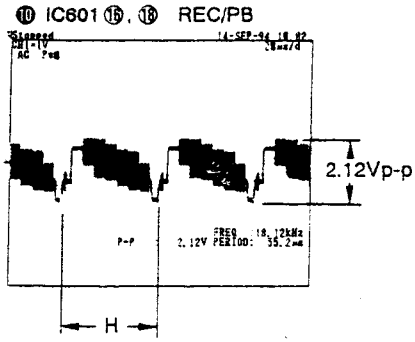
❽ IC601 ⑳ REC/PB



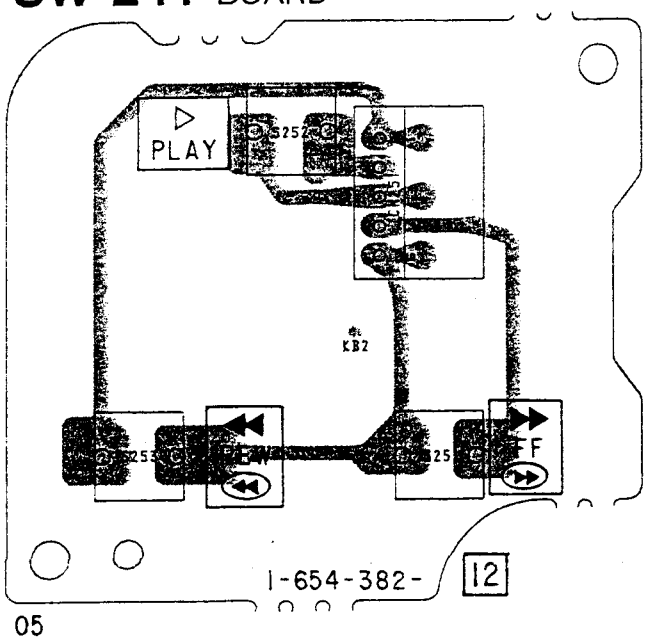
❾ IC801 ⑧ REC

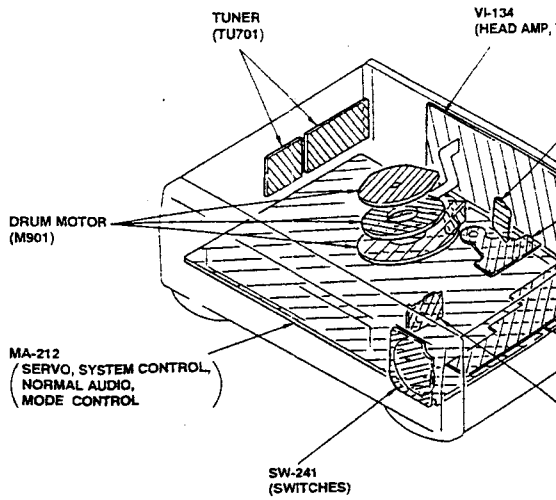


❿ IC601 ⑮, ⑱ REC/PB



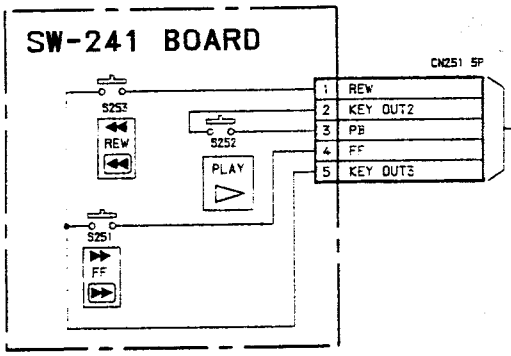
SW-241 BOARD

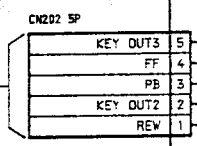


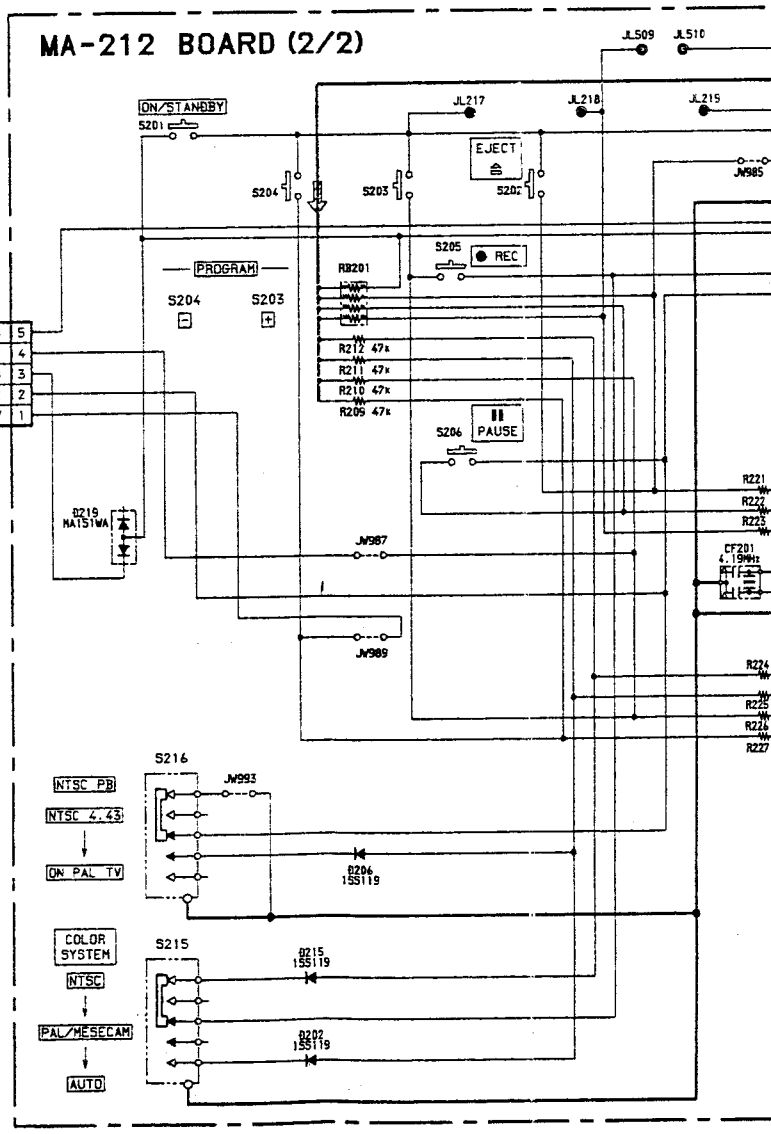


1 2 3 4 5 6 7 8 9 10

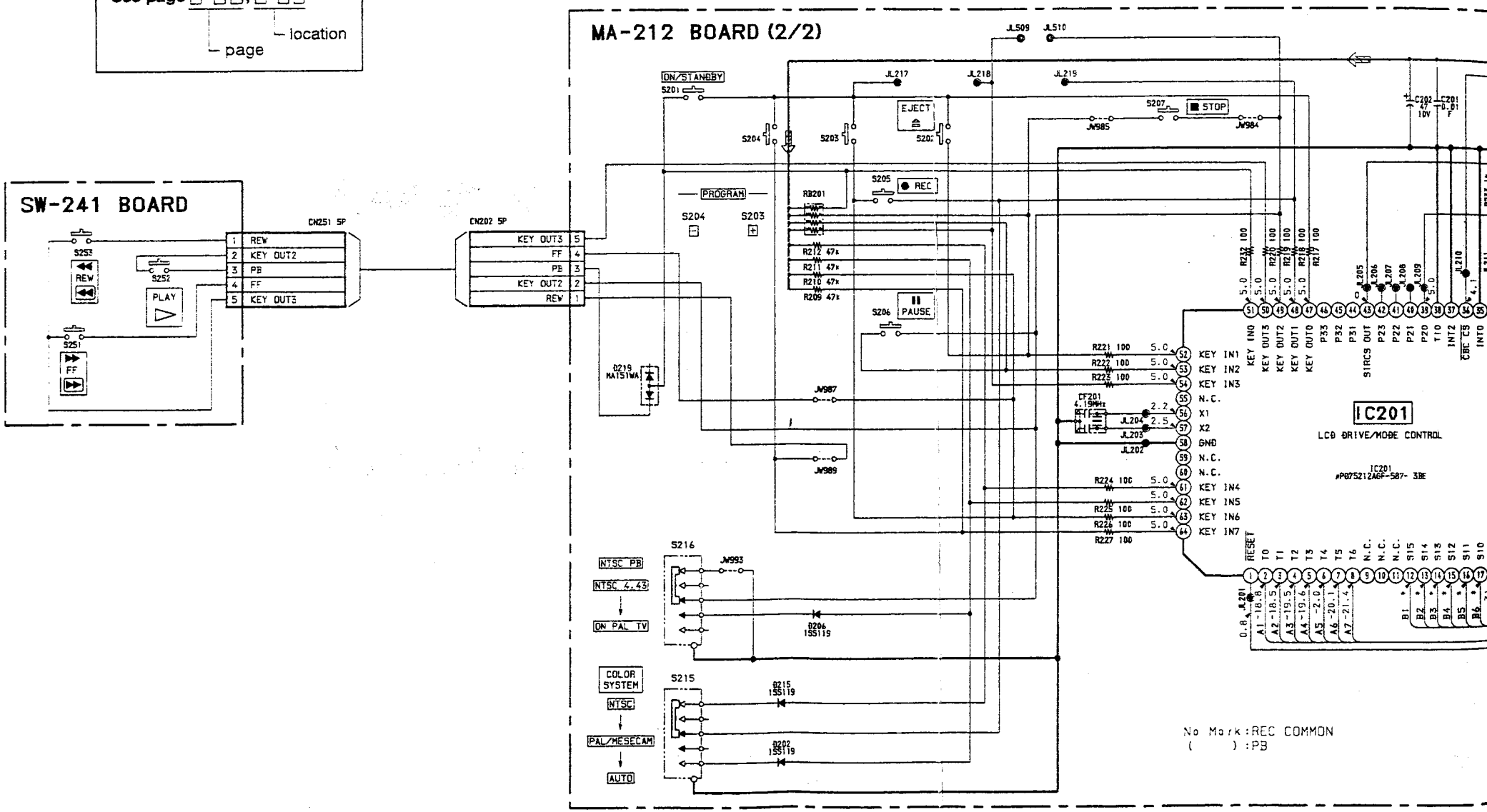
NOTE:
See page □-□□, □-□□
(page, location)

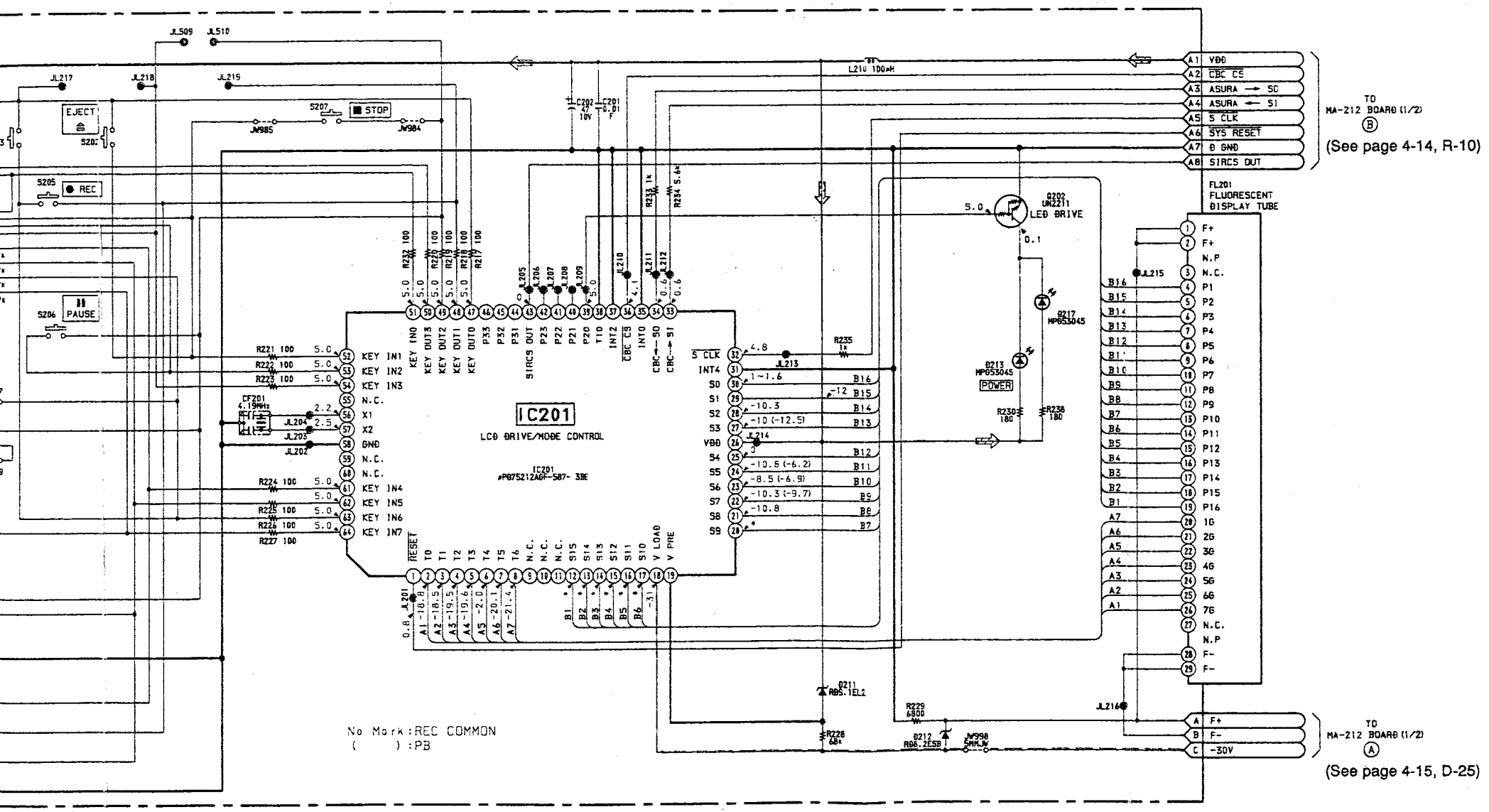






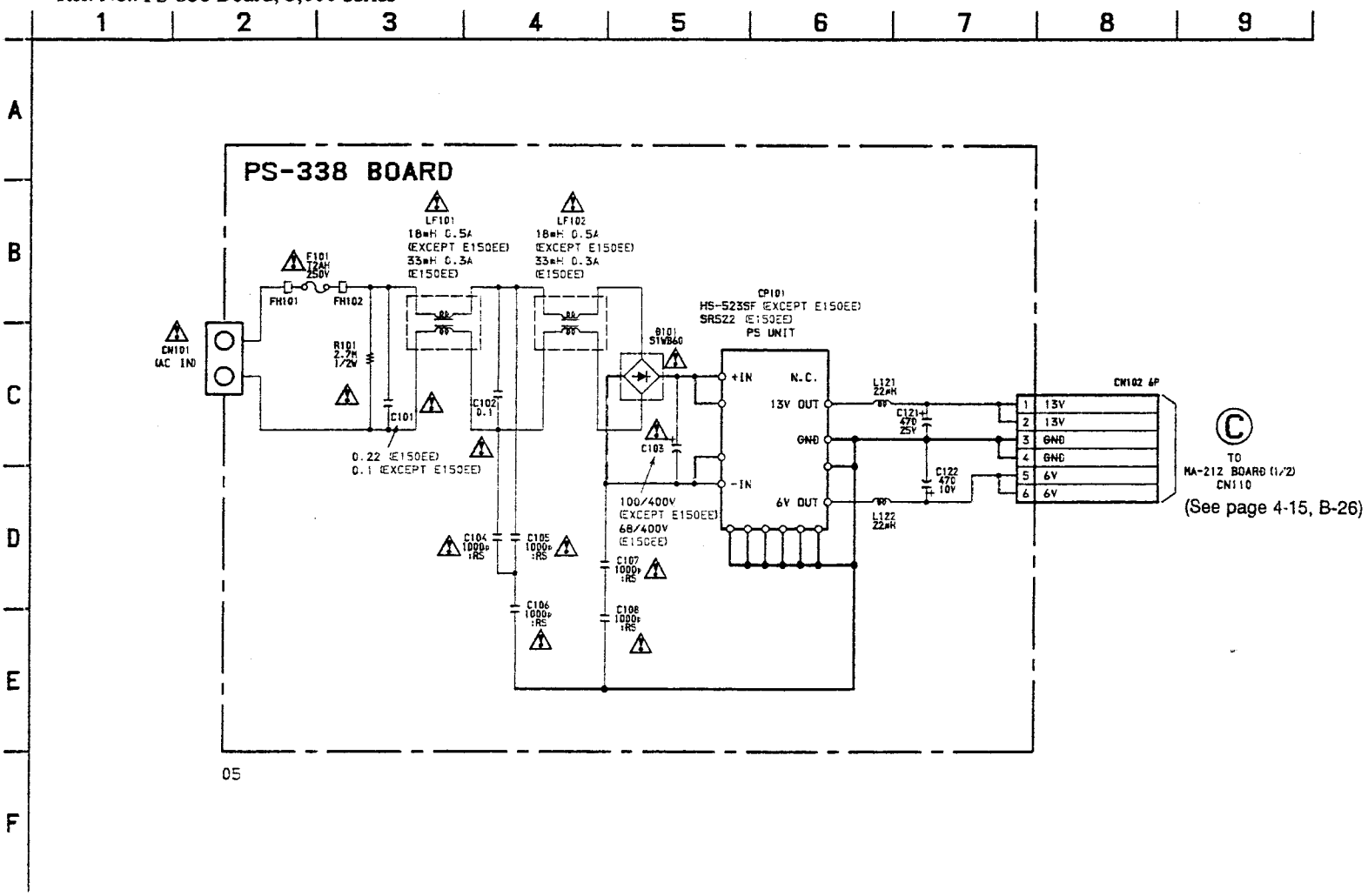
NOTE:
See page □-□□, □-□□
(page, location)

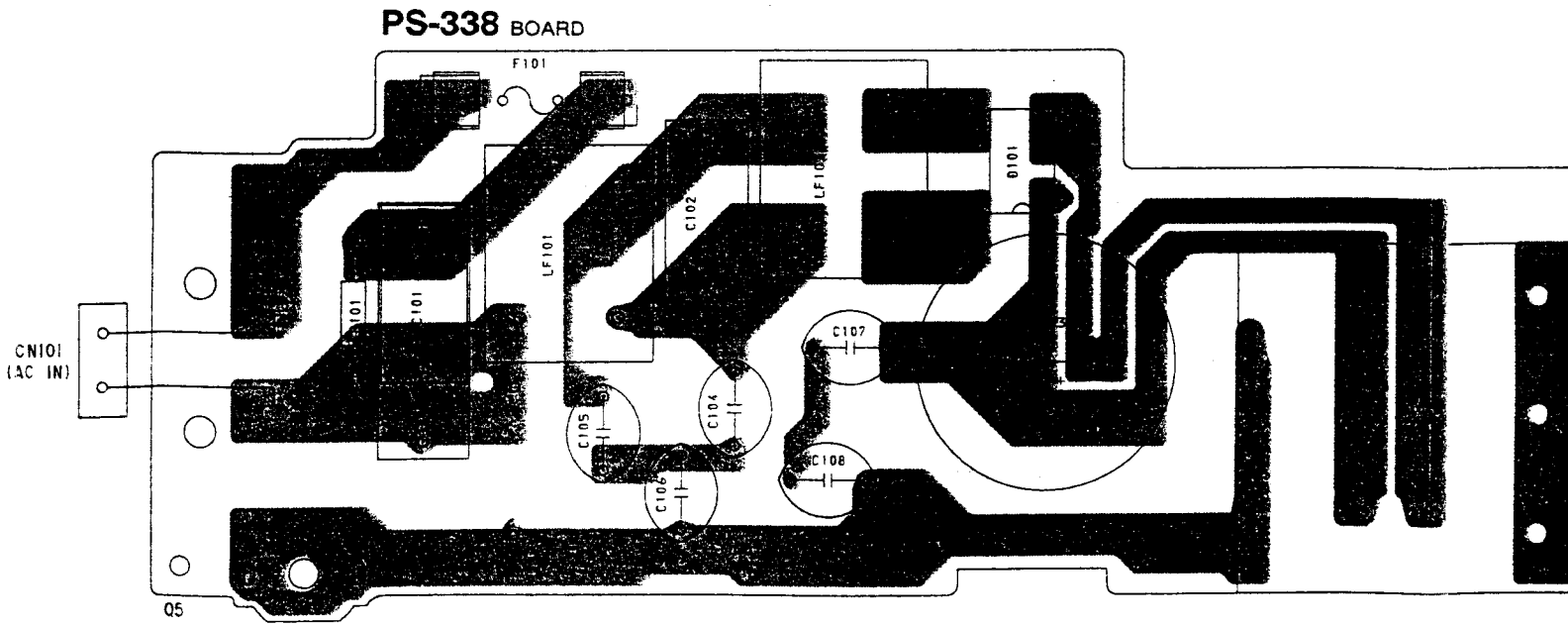



IC201
LCD DRIVE/MODE CONTROL
IC201
μPD75212AGF-587-3BE
CF201
4.19MHz
EJECT
STOP
REC
PAUSE
S205
S206
S207
JL509
JL510
JL217
JL218
JL219
JW985
JW984
L210 100μH
C202 47 10V
C201 0.01 F
Q202 UN2211 LED DRIVE
Q211 RB5.1EL2
Q212 RB6.2ESB
Q213 MPG53045
Q217 MPG53045
POWER
FL201 FLUORESCENT DISPLAY TUBE
JL215
JL216
JL213
JL214
JL201
JL204
JL203
JL202
R221 100
R222 100
R223 100
R224 100
R225 100
R226 100
R227 100
R232 100
R220 100
R219 100
R218 100
R217 100
R233 1k
R234 5.6k
R235 1k
R236 180
R230 180
R229 680Ω
R228 68k
JW998 5MMJW
KEY IN1
KEY IN2
KEY IN3
KEY IN4
KEY IN5
KEY IN6
KEY IN7
KEY IN0
KEY OUT3
KEY OUT2
KEY OUT1
KEY OUT0
SIRCS OUT
CBC CS
INT0
CBC←SO
CBC→SI
S CLK
INT4
SYS RESET
VDD
GND
N.C.
X1
X2
RESET
V LOAD
V PRE
A1 VDD
A2 CBC CS
A3 ASURA → SO
A4 ASURA ← SI
A5 S CLK
A6 SYS RESET
A7 Θ GND
A8 SIRCS OUT
TO MA-212 BOARD (1/2) (B)
(See page 4-14, R-10)
A F+
B F-
C -30V
TO MA-212 BOARD (1/2) (A)
(See page 4-15, D-25)
No Mark:REC COMMON
( ):PB

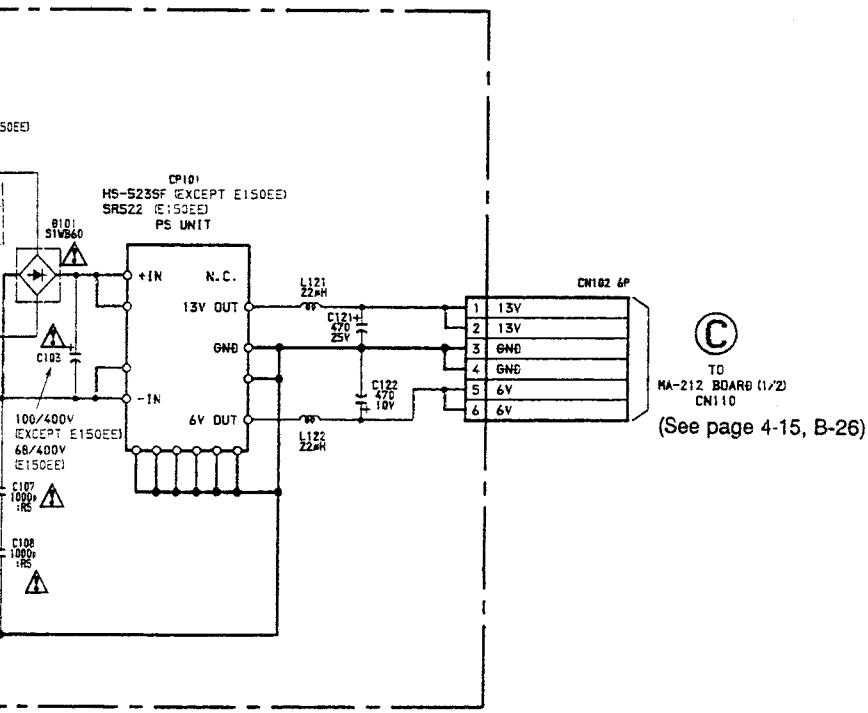
PS-338 (POWER SUPPLY) PRINTED WIRING BOARD AND SCHEMATIC DIAGRAM

– Ref. No.: PS-338 Board; 3,000 series –

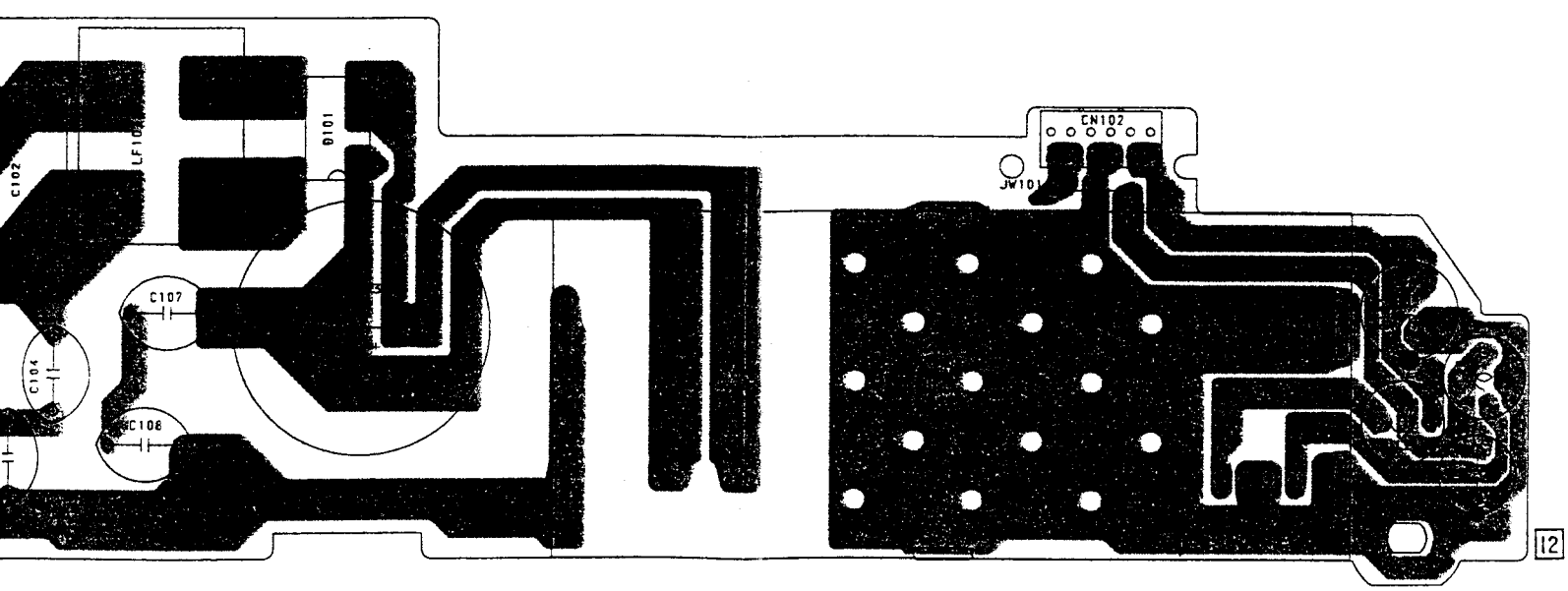




5 6 7 8 9



(See page 4-15, B-26)



SECTION 5
REPAIR PARTS LIST

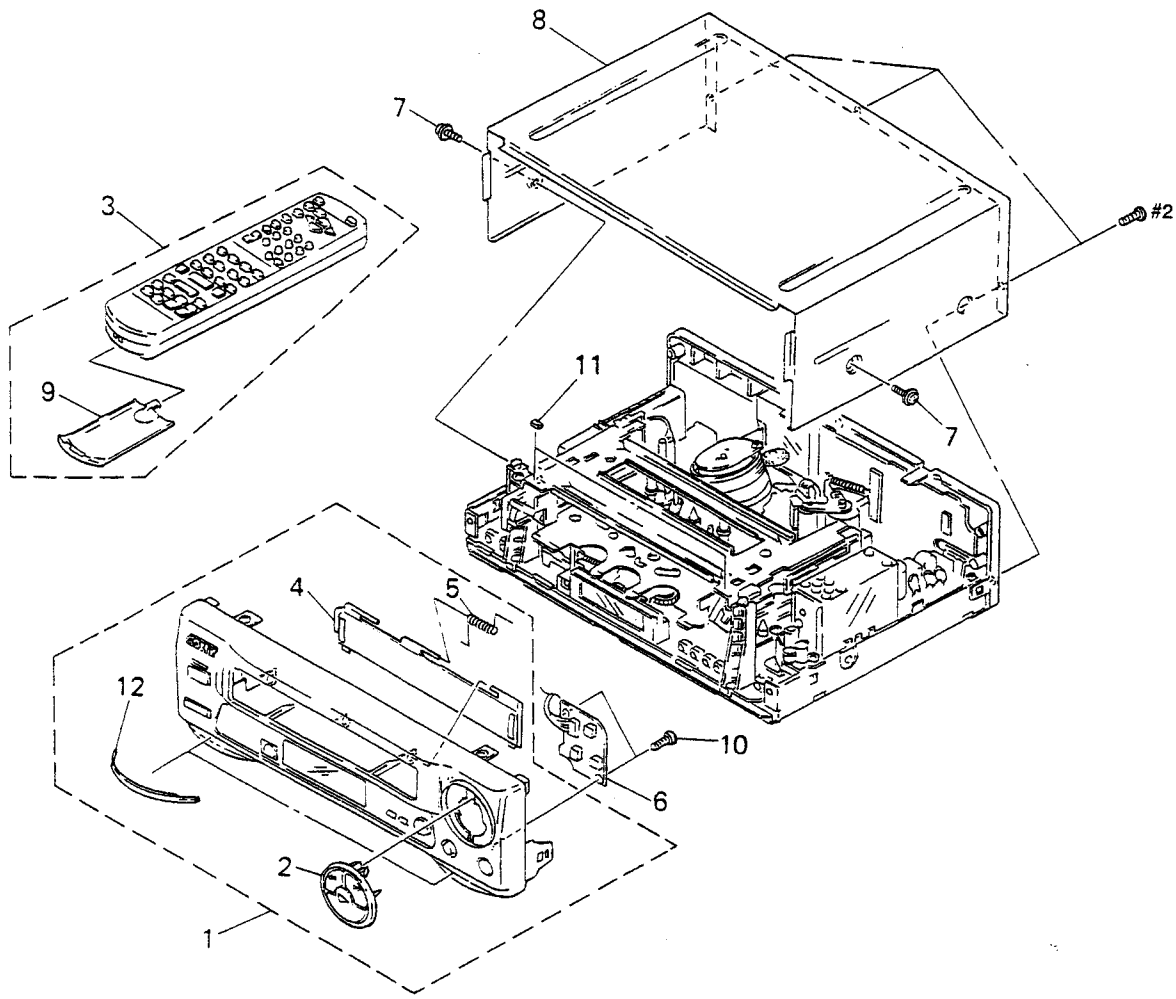
5-1. EXPLODED VIEWS

NOTE:

- -XX and -X mean standardized parts, so they may have some difference from the original one.
- Items marked "*" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- The mechanical parts with no reference number in the exploded views are not supplied.
- Hardware (# mark) list and accessories and packing materials are given in the last of the electrical parts list.

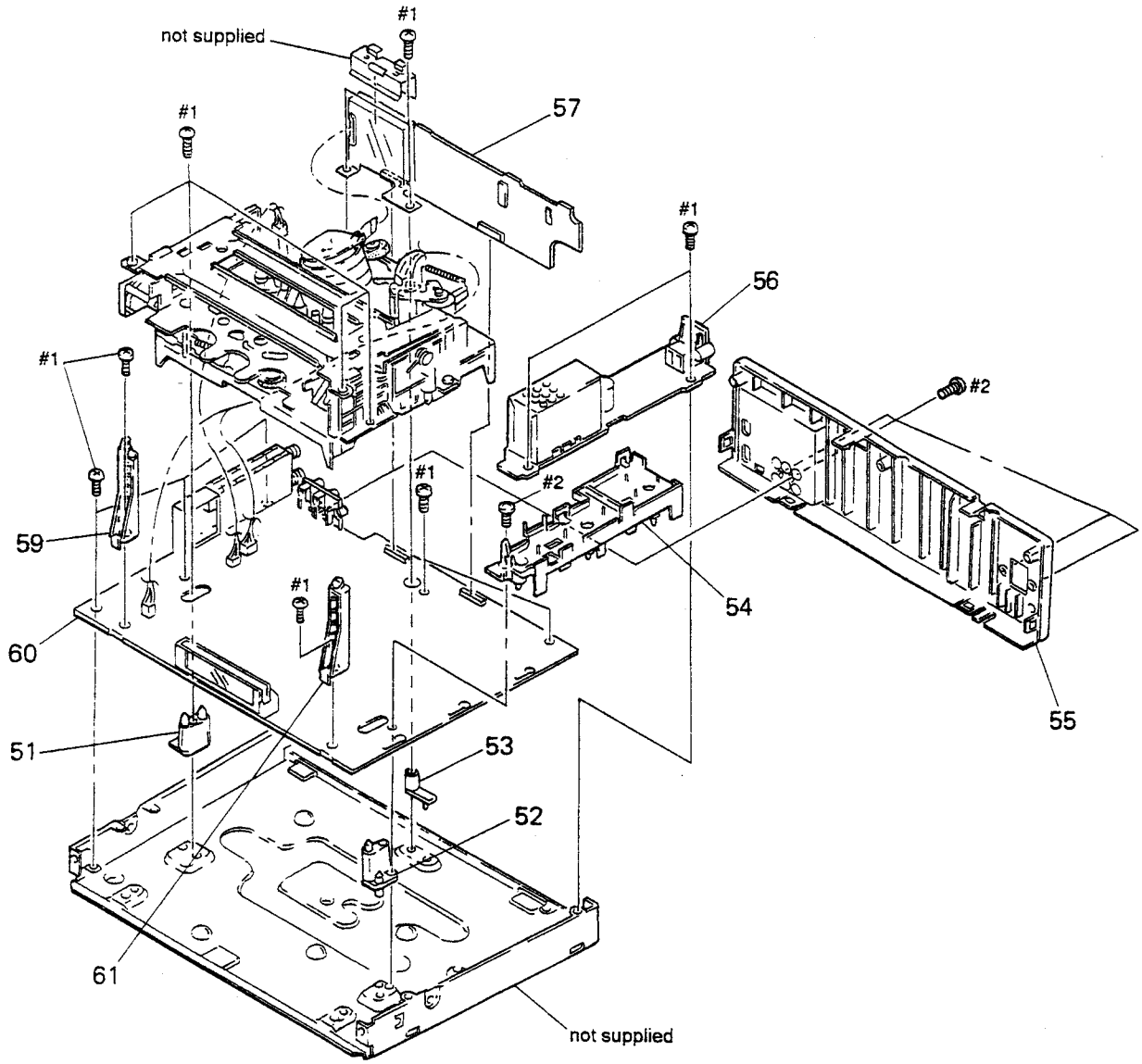
The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

5-1-1. FRONT PANEL ASSEMBLY



Ref. No.	Part No.	Description	Remark
1	X-3944-536-1	PANEL ASSY, FRONT (X312)	
1	X-3944-537-1	PANEL ASSY, FRONT (E150EE)	
2	X-3944-309-1	BUTTON ASSY, FUNCTION (X312)	
2	X-3944-535-1	BUTTON ASSY, FUNCTION (E150EE)	
3	1-467-832-31	REMOTE COMMANDER (RMT-V153B)	
4	3-959-399-11	DOOR, CASSETTE (X312)	
4	3-959-399-21	DOOR, CASSETTE (E150EE)	
5	3-959-400-01	SPRING, FL	
* 6	1-654-382-12	SW-241 BOARD	
7	3-710-901-11	SCREW, TAPPING	
* 8	3-959-393-01	CASE, UPPER	
9	3-708-885-01	COVER, BATTERY	
10	4-921-277-41	SCREW (B2.6X8), TAPPING, BIND	
11	3-961-135-01	CUSHION, RUBBER (X312)	
12	3-961-443-01	INSULATOR (X312)	
12	3-961-443-11	INSULATOR (E150EE)	

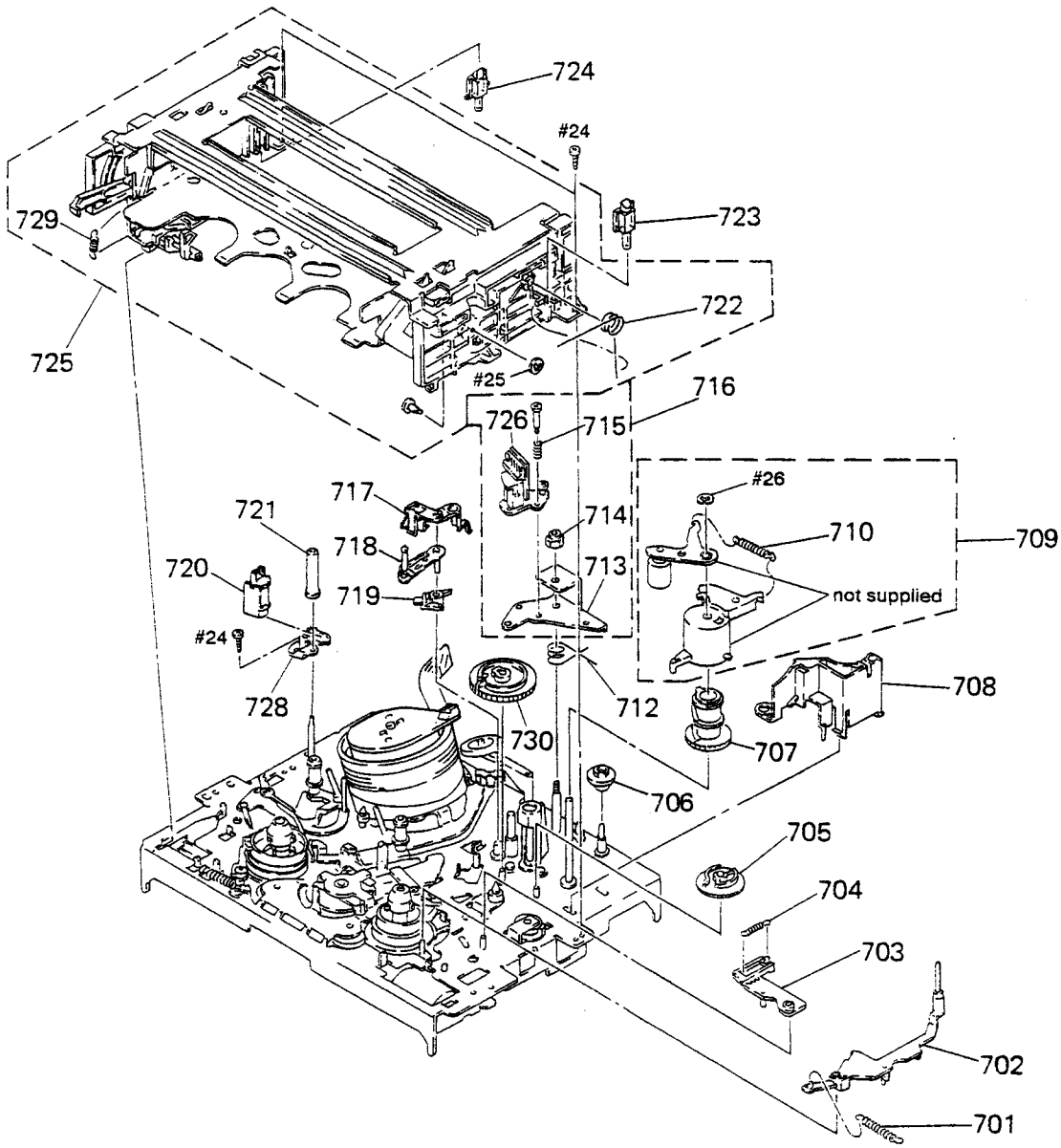
5-1-2. CHASSIS



Ref. No.	Part No.	Description	Remark
* 51	3-959-381-01	BASE (L), MD	
* 52	3-959-383-01	BASE (R), MD	
* 53	3-959-382-01	BASE (M), MD	
* 54	3-959-386-01	HOLDER, POWER	
* 55	3-959-385-51	PANEL, REAR	
⚠* 56	A-6722-449-A	PS-338 BOARD, COMPLETE (X312)	
⚠* 56	A-6794-003-A	PS-338 BOARD, COMPLETE (E150EE)	
* 57	A-6727-603-A	VI-134 BOARD, COMPLETE	
* 59	3-959-388-01	BASE (L), FL	
* 60	A-6782-365-A	MA-212 BOARD, COMPLETE (X312)	
* 60	A-6782-367-A	MA-212 BOARD, COMPLETE (E150EE)	
* 61	3-959-389-01	BASE (R), FL	

Note: The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

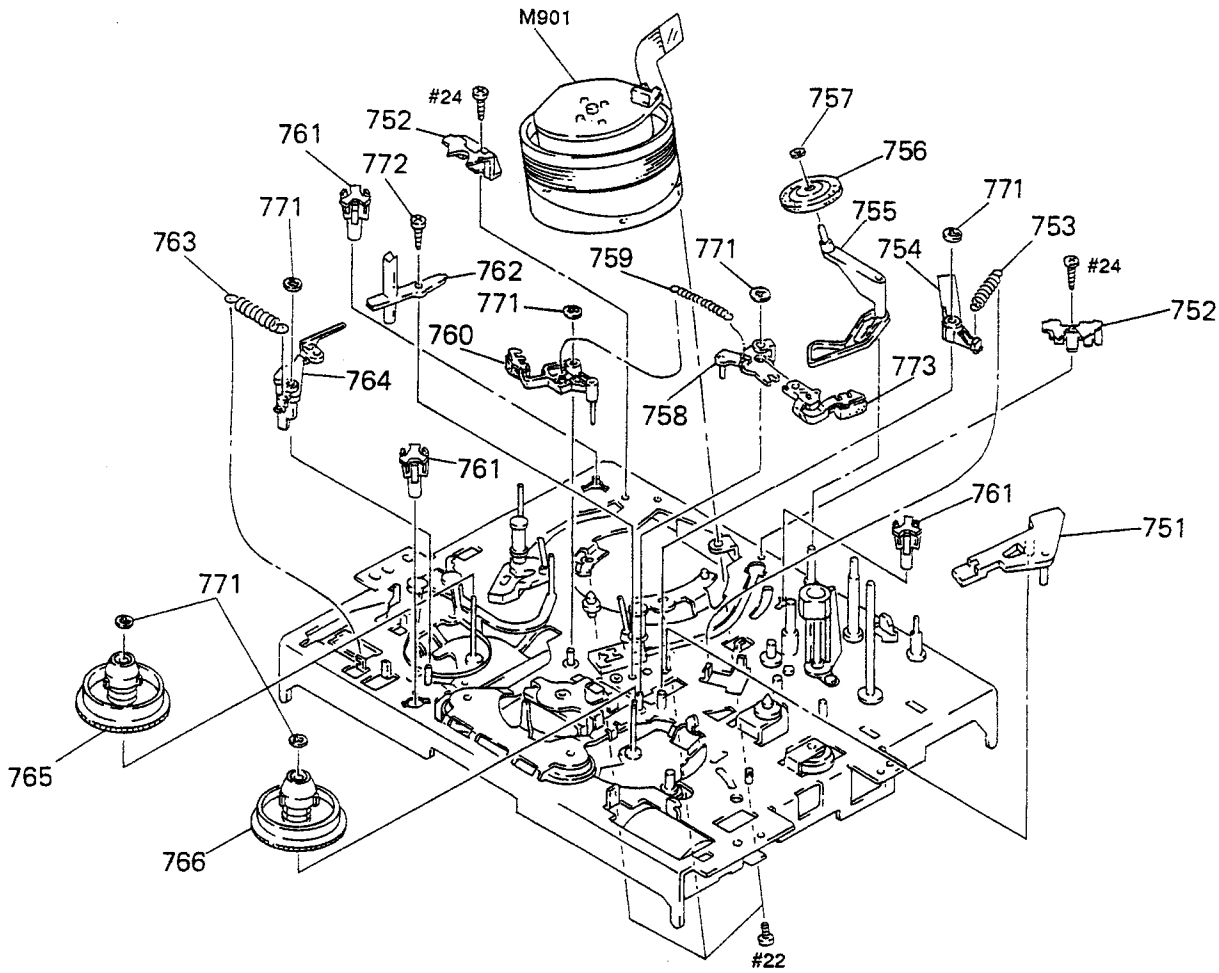
5-1-3. MECHANISM DECK ASSEMBLY (1)



Ref. No.	Part No.	Description	Remark
701	3-958-505-01	SPRING (SOFT BRAKE T), TENSION	
702	X-3943-882-1	BRAKE (T) ASSY, SOFT	
703	X-3943-885-1	ARM ASSY, RVS BRAKE	
704	3-958-462-01	SPRING (RVS BRAKE), TENSION	
705	3-958-153-01	GEAR, PRESS	
706	3-958-501-01	SCREW, ACE ADJUSTMENT	
707	3-958-151-01	GEAR, ELEVATOR	
708	3-958-454-01	OPNER, LID	
709	A-6746-072-A	PRESS BLOCK ASSY, PINCH	
710	3-958-455-01	SPRING (PINCH), TENSION	
712	3-958-487-01	SPRING, (AEC) TORSION COIL	
713	3-958-491-01	BASE, ACE	
714	3-942-867-01	NUT, AC HEIGHT ADJUSTMENT	
715	3-960-439-01	SPRING (ACE), COMPRESSION	

Ref. No.	Part No.	Description	Remark
716	A-6736-103-A	ACE BLOCK ASSY	
717	3-962-298-01	BRACKET, TG7	
718	X-3944-797-1	TG8 ASSY	
719	3-958-421-01	HOLDER, TG8	
720	1-500-144-11	HEAD, FE	
721	X-3944-460-1	ROLLER ASSY, TG2	
722	3-958-195-01	SPRING, TORSION	
723	3-960-216-01	PLATE, LIGHT GUIDE, TOP SENSOR	
724	3-960-215-01	PLATE, LIGHT GUIDE, END SENSOR	
725	A-6751-496-A	FL BLOCK ASSY	
726	1-506-485-11	PIN, CONNECTOR 6P	
728	3-959-841-01	HOLDER, FEH	
729	3-958-467-01	SPRING, TENSION COIL	
730	3-958-152-01	GEAR, TG8	

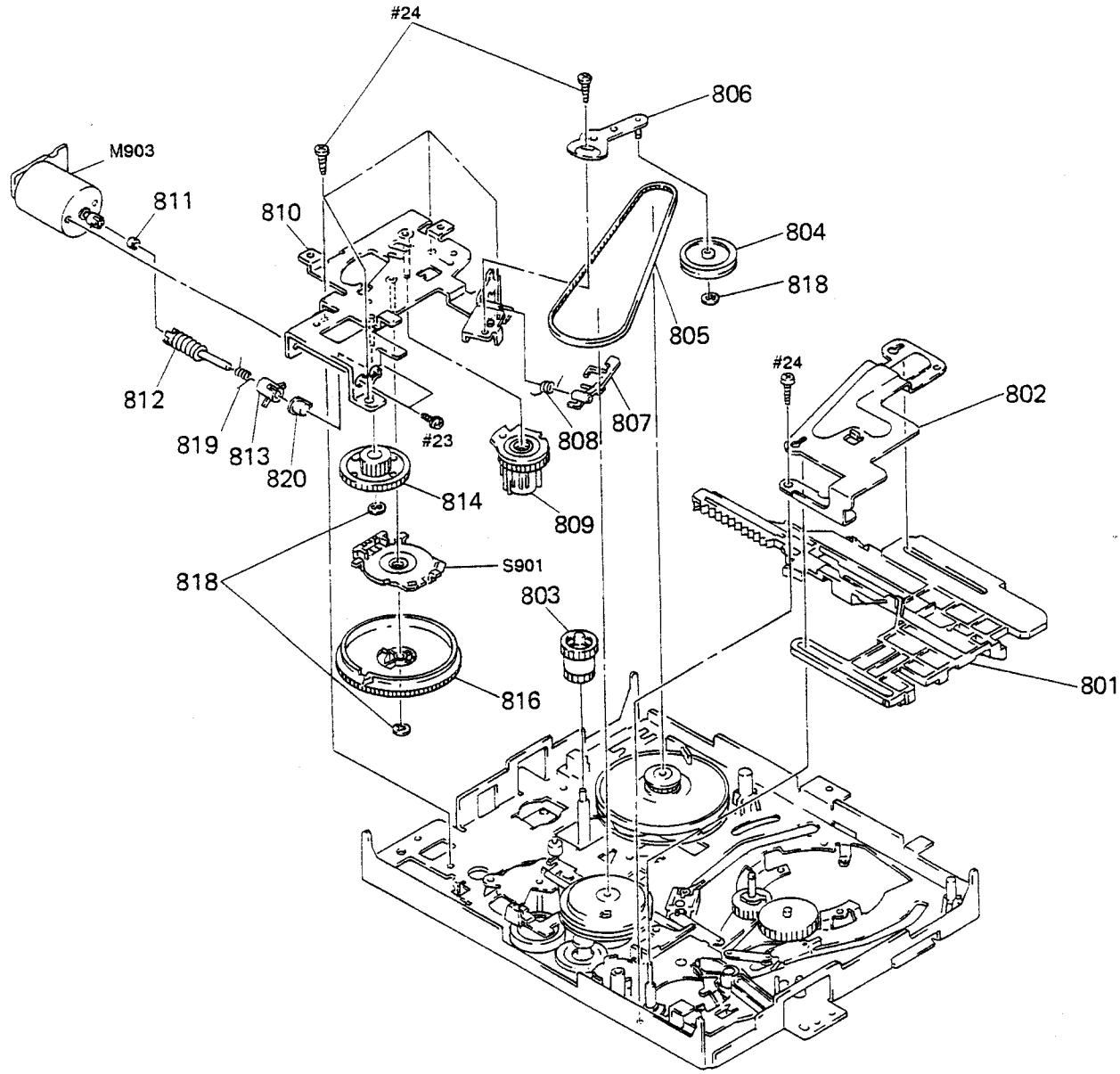
5-1-4. MECHANISM DECK ASSEMBLY (2)



Ref. No.	Part No.	Description	Remark
751	3-960-138-01	ARM, PENDULUM COMPULSION	
752	3-958-389-01	CATCHER	
753	3-958-535-01	SPRING, TENSION	
754	3-960-139-01	ARM, NEUTRALITY	
755	X-3943-896-1	ARM ASSY, HC	
756	X-3944-363-1	ROLLER ASSY, HC	
757	3-321-393-01	WASHER, STOPPER	
758	X-3944-628-1	BRAKE (T) ASSY, MAIN	
759	3-958-517-01	SPRING, TENSIONCOIL	
760	X-3944-599-1	BRAKE (S) ASSY, MAIN	

Ref. No.	Part No.	Description	Remark
761	3-958-390-01	SHAFT, PC BOARD	
762	3-958-391-01	PLATE, LIGHT GUIDE, LED	
763	3-958-443-01	SPRING, STRETCH COIL SPRING	
764	3-958-450-01	BRAKE (S), SOFT	
765	X-3943-902-1	TABLE, REEL (S) ASSY	
766	X-3943-903-1	TABLE, REEL (T) ASSY	
771	3-669-595-00	WASHER (2), STOPPER	
772	3-961-441-01	SCREW (3X8)	
773	X-3944-598-1	CAP ASSY, MAIN BRAKE	
M901	1-759-034-11	DRUM ASSY (DZH-72A-R)	

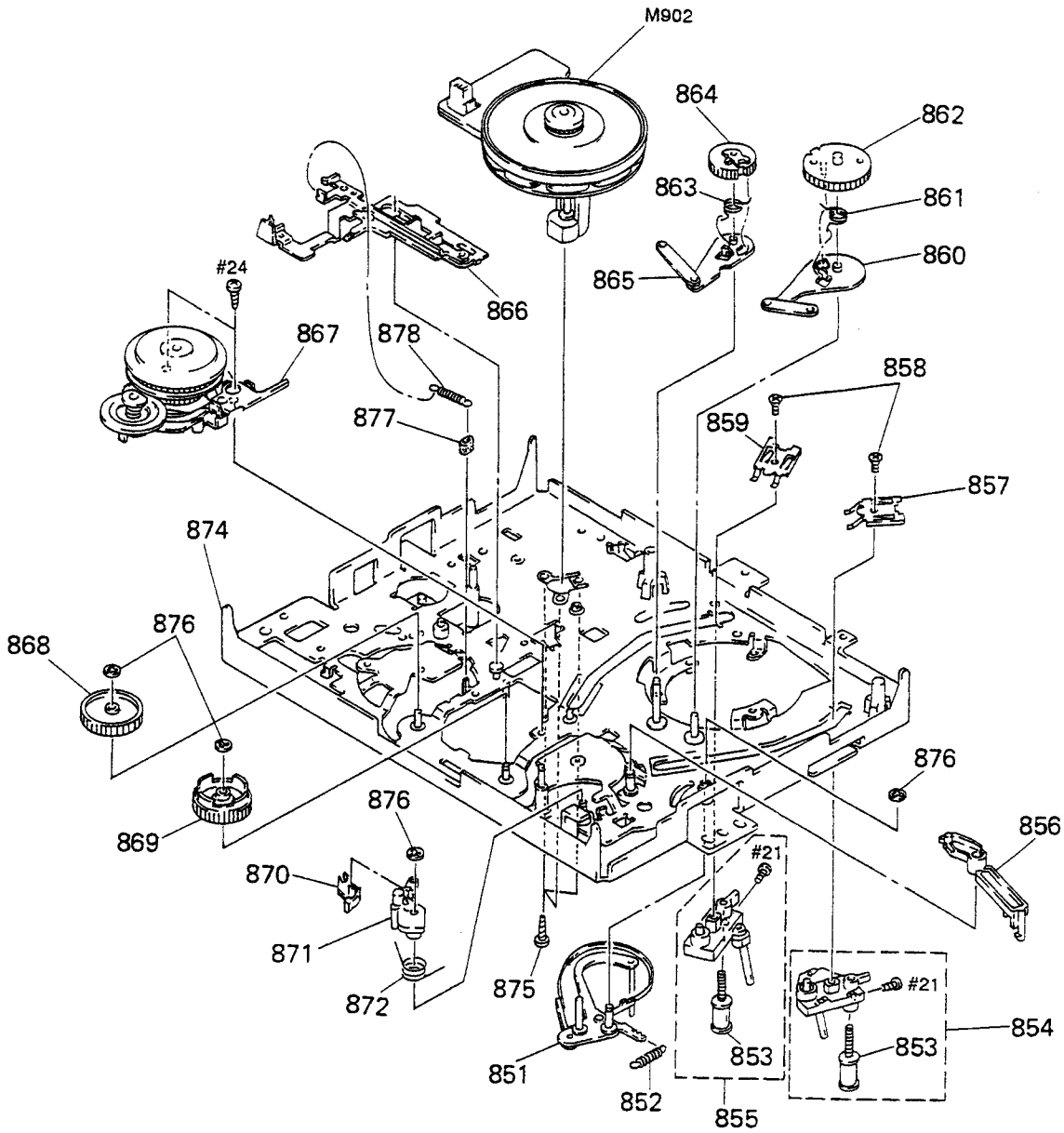
5-1-5. MECHANISM DECK ASSEMBLY (3)



Ref. No.	Part No.	Description	Remark
801	3-958-163-01	SLIDER, MAIN	
* 802	3-959-763-01	RETAINER	
803	3-958-162-01	GEAR, UPPER/LOWER COMMUNICATION	
804	3-958-448-01	WHEEL, TENSION	
805	3-958-361-01	BELT, TIMING	
806	X-3943-889-1	ARM ASSY, TENSION VEHICLE	
807	X-3943-888-1	BRAKE ASSY, CAP	
808	3-958-445-01	SPRING, TORSIONCOIL (CAP BRAKE)	
809	3-958-156-01	GEAR, FL DRIVING	
* 810	X-3943-884-1	CHASSIS ASSY, CAM MOTOR	

Ref. No.	Part No.	Description	Remark
811	3-959-840-01	RUBBER, JOINT	
812	3-958-159-01	WORM	
813	3-958-160-01	PROPELLOR	
814	3-958-157-01	WHEEL, WORM	
816	3-958-161-01	GEAR, CAM	
818	3-669-595-00	WASHER (2), STOPPER	
819	3-958-460-01	SPRING, ONE-WAY	
820	3-958-155-01	BEARING, CAM MOTOR	
M903	X-3943-883-1	MOTOR ASSY, CAM	
S901	1-762-076-11	SWITCH, ROTARY	

5-1-6. MECHANISM DECK ASSEMBLY (4)



Ref. No.	Part No.	Description	Remark
851	X-3943-886-1	TG1 ASSY	
852	3-958-492-01	SPRING (TG1), TENSION COIL	
853	X-3944-378-1	ROLLER ASSY, GUIDE	
854	A-6750-316-A	SHUTTLE (S) BLOCK ASSY	
855	A-6750-314-A	T BLOCK ASSY, SHUTTLE	
856	3-958-504-01	ARM, FIXED RELEASE	
857	3-960-687-01	SPRING, LEAF (S), LOADING	
858	3-960-720-01	SCREW	
859	3-960-688-01	SPRING, LEAF (T), LOADING	
860	X-3943-890-1	LEVER (S) ASSY, LOADING	
861	3-960-448-01	SPRING (S), TORSION COIL	
862	3-958-476-01	GEAR (S), LOADING	
863	3-960-449-01	SPRING (T), TORSION COIL	
864	3-958-485-01	GEAR (T), LOADING	
865	X-3943-891-1	LEVER (T) ASSY, LOADING	
866	X-3943-897-1	LEVER ASSY, TRIGGER	
867	A-6739-102-A	RKB BLOCK ASSY	
868	3-958-191-01	GEAR (T), IDLER	
869	3-958-190-01	GEAR (S), IDLER	
870	3-958-533-01	CLAW, S WINDING	
871	3-958-532-01	ARM, S WINDING	
872	3-958-534-01	SPRING, TORSION	
* 874	X-3943-874-1	CHASSIS ASSY, MECHANICAL	
875	3-960-272-01	SCREW (2.6)	
876	3-669-595-00	WASHER (2), STOPPER	
877	3-959-840-01	RUBBER, JOINT	
878	3-958-529-01	SPRING (MOMENT), TENSION	
M902	1-698-409-11	MOTOR, DC	

5-2. ELECTRICAL PARTS LIST

NOTE:

- Due to standardization, replacements in the parts list may be different from the parts specified in the diagrams or the components used on the set.
- -XX and -X mean standardized parts, so they may have some difference from the original one.
- RESISTORS
  All resistors are in ohms.
  METAL:Metal-film resistor.
  METAL OXIDE: Metal oxide-film resistor.
  F:nonflammable
- Items marked "*" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- SEMICONDUCTORS
  In each case, u:μ, for example:
  uA..: μA.. uPA..: μPA..
  uPB..: μPB.. uPC..: μPC.. uPD..: μPD..
- CAPACITORS
  uF: μF
- COILS
  uH: μH

The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety. Replace only with part number specified.

When indicating parts by reference number, please include the board.

Ref. No.	Part No.	Description			Remark
*	A-6782-365-A	MA-212 BOARD, COMPLETE (X312)			
		**********			
*	A-6782-367-A	MA-212 BOARD, COMPLETE (E150EE)			
		**********			
		(Ref. No. 2,000 Series)			
*	3-959-384-01	HOLDER, INDICATION TUBE			
*	3-960-273-01	SPACER, TOP END			
*	3-960-274-01	SPACER, LED			
		< CAPACITOR >			
C123	1-126-101-11	ELECT	100uF	20%	16V
C124	1-124-477-11	ELECT	47uF	20%	25V
C125	1-124-477-11	ELECT	47uF	20%	25V
C131	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C181	1-124-589-11	ELECT	47uF	20%	16V
C182	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C183	1-124-910-11	ELECT	47uF	20%	50V
C185	1-124-910-11	ELECT	47uF	20%	50V
C187	1-124-589-11	ELECT	47uF	20%	16V
C201	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C202	1-124-589-11	ELECT	47uF	20%	16V
C297	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C301	1-137-431-11	FILM	560PF	5%	50V
C302	1-163-011-11	CERAMIC CHIP	0.0015uF	10%	50V
C303	1-104-696-11	FILM	0.015uF	5%	100V
C304	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C305	1-126-101-11	ELECT	100uF	20%	16V
C354	1-124-927-11	ELECT	4.7uF	20%	100V
C355	1-126-233-11	ELECT	22uF	20%	50V
C356	1-126-233-11	ELECT	22uF	20%	50V
C357	1-124-252-00	ELECT	0.33uF	20%	50V
C358	1-124-257-00	ELECT	2.2uF	20%	50V
C359	1-163-141-00	CERAMIC CHIP	0.001uF	5%	50V
C360	1-163-141-00	CERAMIC CHIP	0.001uF	5%	50V
C361	1-163-143-00	CERAMIC CHIP	0.0012uF	5%	50V
C362	1-163-014-00	CERAMIC CHIP	0.0027uF	5%	50V
C363	1-126-962-11	ELECT	3.3uF	20%	50V
C364	1-124-927-11	ELECT	4.7uF	20%	100V
C365	1-137-370-11	FILM	0.01uF	5%	50V
C366	1-164-159-11	CERAMIC	0.1uF		50V
C367	1-124-903-11	ELECT	1uF	20%	50V
C368	1-164-159-11	CERAMIC	0.1uF		50V
C369	1-164-159-11	CERAMIC	0.1uF		50V
C402	1-163-038-00	CERAMIC CHIP	0.1uF		25V
C403	1-163-038-00	CERAMIC CHIP	0.1uF		25V
C404	1-163-033-00	CERAMIC CHIP	0.022uF		50V
C405	1-163-033-00	CERAMIC CHIP	0.022uF		50V
C406	1-126-157-11	ELECT	10uF	20%	16V
C407	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C408	1-124-589-11	ELECT	47uF	20%	16V
C410	1-126-233-11	ELECT	22uF	20%	50V
C411	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C412	1-130-488-00	MYLAR	0.027uF	5%	50V
C413	1-130-489-00	MYLAR	0.033uF	5%	50V
C415	1-126-176-11	ELECT	220uF	20%	10V
C416	1-124-126-00	ELECT	47uF	20%	10V
C417	1-124-126-00	ELECT	47uF	20%	10V
C418	1-163-035-00	CERAMIC CHIP	0.047uF		50V
C419	1-164-344-11	CERAMIC CHIP	0.068uF	10%	25V
C420	1-124-443-00	ELECT	100uF	20%	10V
C421	1-126-233-11	ELECT	22uF	20%	50V
C422	1-163-009-11	CERAMIC CHIP	0.001uF	10%	50V
C423	1-163-017-00	CERAMIC CHIP	0.0047uF	5%	50V
C425	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C426	1-124-925-11	ELECT	2.2uF	20%	100V
C429	1-124-925-11	ELECT	2.2uF	20%	100V
C431	1-124-589-11	ELECT	47uF	20%	16V
C432	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C433	1-163-077-91	CERAMIC CHIP	0.1uF		50V
C434	1-163-038-00	CERAMIC CHIP	0.1uF		25V
C440	1-124-907-11	ELECT	10uF	20%	50V
C441	1-163-009-11	CERAMIC CHIP	0.001uF	10%	50V
C442	1-163-009-11	CERAMIC CHIP	0.001uF	10%	50V
C443	1-163-009-11	CERAMIC CHIP	0.001uF	10%	50V
C486	1-124-589-11	ELECT	47uF	20%	16V
C488	1-163-009-11	CERAMIC CHIP	0.001uF	10%	50V
C489	1-163-009-11	CERAMIC CHIP	0.001uF	10%	50V

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Ref. No.	Part No.	Description			Remark
C501	1-164-004-11	CERAMIC CHIP	0.1uF	10%	25V
C502	1-163-229-11	CERAMIC CHIP	12PF	5%	50V
C503	1-163-229-11	CERAMIC CHIP	12PF	5%	50V
C505	1-124-584-00	ELECT	100uF	20%	10V
C506	1-163-038-00	CERAMIC CHIP	0.1uF		25V
C507	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C508	1-104-905-11	CAP, DOUBLE LAYERS	0.22F		
C509	1-163-237-11	CERAMIC CHIP	27PF	5%	50V
C510	1-163-235-11	CERAMIC CHIP	22PF	5%	50V
C511	1-163-035-00	CERAMIC CHIP	0.047uF		50V
C512	1-124-472-11	ELECT	470uF	20%	10V
C514	1-163-038-00	CERAMIC CHIP	0.1uF		25V
C519	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C520	1-124-126-00	ELECT	47uF	20%	10V
C524	1-164-232-11	CERAMIC CHIP	0.01uF		50V
C591	1-124-589-11	ELECT	47uF	20%	16V
C592	1-163-031-11	CERAMIC CHIP	0.01uF	50V	(E150EE)
C601	1-124-589-11	ELECT	47uF	20%	16V
C602	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C609	1-124-589-11	ELECT	47uF	20%	16V
C610	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C615	1-163-111-00	CERAMIC CHIP	56PF	5%	50V
C616	1-163-111-00	CERAMIC CHIP	56PF	5%	50V
C617	1-163-119-00	CERAMIC CHIP	120PF	5%	50V
C618	1-124-254-00	ELECT	0.68uF	20%	50V
C620	1-130-481-00	MYLAR	0.0068uF	5%	50V
C621	1-124-499-11	ELECT, NONPOLAR	1uF	20%	50V
C622	1-130-487-00	MYLAR	0.022uF	5%	50V
C623	1-124-465-00	ELECT	0.47uF	20%	50V
C624	1-163-102-00	CERAMIC CHIP	24PF	5%	50V
C627	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C631	1-163-234-11	CERAMIC CHIP	20PF	5%	50V
C632	1-163-234-11	CERAMIC CHIP	20PF	5%	50V
C703	1-124-126-00	ELECT	47uF	20%	10V
C705	1-124-126-00	ELECT	47uF	20%	10V
C706	1-126-163-11	ELECT	4.7uF	20%	50V
C707	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C709	1-163-009-11	CERAMIC CHIP	0.001uF	10%	50V
C710	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C711	1-126-101-11	ELECT	100uF	20%	16V
C722	1-163-016-00	CERAMIC CHIP	0.0039uF	10%	50V
C725	1-124-472-11	ELECT	470uF	20%	10V
C726	1-126-233-11	ELECT	22uF	20%	50V
C732	1-163-131-00	CERAMIC CHIP	390PF	5%	50V
C801	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C852	1-124-638-11	ELECT	22uF	20%	10V
C853	1-124-126-00	ELECT	47uF	20%	10V
C854	1-126-233-11	ELECT	22uF	20%	50V

Ref. No.	Part No.	Description	Remark
		< FILTER >	
CF201	1-577-101-11	VIBRATOR, CERAMIC	
		< CONNECTOR >	
* CN110	1-766-694-11	CONNECTOR, BOARD TO BOARD 6P	
CN202	1-506-470-11	PIN, CONNECTOR 5P	
* CN302	1-560-892-00	PIN, CONNECTOR 4P	
* CN303	1-560-891-00	PIN, CONNECTOR 3P	
* CN407	1-560-891-00	PIN, CONNECTOR 3P	
* CN410	1-766-716-11	CONNECTOR, BOARD TO BOARD 3P	
* CN412	1-564-004-11	PIN, CONNECTOR 5P	
* CN413	1-766-538-11	CONNECTOR, BOARD TO BOARD 8P	
* CN415	1-766-537-11	CONNECTOR (HMD) 5P	
CN801	1-573-844-11	CONNECTOR, BOARD TO BOARD 12P	
CN802	1-766-718-11	CONNECTOR, BOARD TO BOARD 17P	
		< JACK >	
CNJ01	1-568-185-21	JACK, PIN 4P	
		< COMPOSITION CIRCUIT BLOCK >	
⚠CP181	1-467-811-11	UNIT, DC-DC CONVERTER	
		< TRIMMER >	
CT601	1-141-334-11	CAP, VAR, TRIMMER	
		< DIODE >	
⚠D121	8-719-200-82	DIODE 11ES2	
D122	8-719-109-85	DIODE RD5.1ES-B2	
D123	8-719-911-19	DIODE 1SS119	
D202	8-719-911-19	DIODE 1SS119	
D206	8-719-911-19	DIODE 1SS119	
D211	8-719-101-73	DIODE RD9.1E-L2	
D212	8-719-110-08	DIODE RD8.2ES-B2	
D213	8-719-050-12	DIODE MPG5304S	
D215	8-719-911-19	DIODE 1SS119	
D217	8-719-050-12	DIODE MPG5304S	
D219	8-719-104-34	DIODE 1S2836	
D304	8-719-911-19	DIODE 1SS119	
D401	8-719-911-19	DIODE 1SS119	
D402	8-719-101-50	DIODE RD5.1E-L2	
D405	8-719-109-93	DIODE RD6.2ES-B2	
D406	8-719-109-93	DIODE RD6.2ES-B2	
D407	8-719-048-26	DIODE GL528V1	
D408	8-719-101-47	DIODE RD4.7E-L2	
D410	8-719-110-14	DIODE RD9.1ES-B3	
D501	8-719-911-19	DIODE 1SS119	

The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety. Replace only with part number specified.

Ref. No.	Part No.	Description	Remark
⚠D502	8-719-200-82	DIODE 11ES2	
⚠D503	8-719-200-82	DIODE 11ES2	
D603	8-719-911-19	DIODE 1SS119	
⚠D703	8-719-800-76	DIODE 1SS226	
⚠D704	8-719-110-78	DIODE RD33ES-B2	
D705	8-719-109-81	DIODE RD4.7ES-B2	
D706	8-719-109-81	DIODE RD4.7ES-B2	
D709	8-719-109-81	DIODE RD4.7ES-B2	
D716	8-719-109-96	DIODE RD6.8ES-B1	
		< FILTER >	
FL201	1-517-343-11	TUBE, FLUORESCENT INDICATOR	
		< IC >	
⚠IC121	8-759-189-48	IC PQ12RE11 (12V REG)	
IC201	8-759-290-71	IC uPD75212AGF-587-3BE (LCD DRIVE, MODE CONTROL)	
IC291	1-466-833-21	IC RAY-CATCHER BLOCK, REMOCON (REMOTE CONTROL RECEIVER)	
IC301	8-759-268-02	IC BA7796FS-E2 (NORMAL AUDIO REC/PB AMP)	
IC403	8-759-702-02	IC NJM062M (CAPSTAN/DRUM)	
IC406	8-759-246-14	IC TA8823N (CTL REC/PB AMP)	
IC407	8-759-100-95	IC uPC324G2 (TAPE END DET/REEL FG AMP)	
⚠IC410	8-759-294-26	IC BA6209-V2 (LOADING MOTOR DRIVE)	
IC501	8-752-862-67	IC CXP87248-055Q (SERVO, SYSTEM CONTROL)	
IC504	8-759-278-57	IC AK6420HF-E2 (EEP ROM)	
IC507	8-759-248-87	IC MM1256XF-BE (POWER FAIL DET, RESET PULSE GENE)	
IC601	8-759-261-79	IC LC74790M-9057-TE-L (CHARACTER GENERATOR)	
IC801	8-759-927-56	IC BA7021 (VIDEO SWITCH)	
		< JUMPER RESISTOR >	
JR704	1-216-295-00	CONDCTOR, CHIP (2012)	
JR705	1-216-295-00	CONDCTOR, CHIP (2012)	
JR706	1-216-295-00	CONDCTOR, CHIP (2012)	
JR914	1-216-295-00	CONDCTOR, CHIP (2012)	
JR931	1-216-295-00	CONDCTOR, CHIP (2012) (X312)	
JW906	1-410-500-11	INDUCTOR 1.8UH	
		< COIL >	
L181	1-408-970-21	INDUCTOR 10uH	
L182	1-410-526-11	INDUCTOR 10uH	
L183	1-410-526-11	INDUCTOR 10uH	
L210	1-408-982-11	INDUCTOR 100uH	
L301	1-410-687-11	INDUCTOR 1.2mH	
L304	1-414-183-41	INDUCTOR 10uH	
L401	1-408-974-21	INDUCTOR 22uH	
L403	1-408-982-11	INDUCTOR 100uH	
L501	1-414-183-41	INDUCTOR 10uH	
L503	1-414-183-41	INDUCTOR 10uH	
⚠L505	1-414-179-21	INDUCTOR 2.2uH	
L601	1-414-189-31	INDUCTOR 100uH	
L602	1-414-189-31	INDUCTOR 100uH	
L603	1-410-513-11	INDUCTOR 22uH	
L604	1-410-506-11	INDUCTOR 5.6uH	
L701	1-414-183-41	INDUCTOR 10uH	
L702	1-414-186-31	INDUCTOR 33uH	
L706	1-408-401-00	INDUCTOR 2.2uH	
L707	1-408-401-00	INDUCTOR 2.2uH	
L708	1-408-982-11	INDUCTOR 100uH	
L801	1-408-982-11	INDUCTOR 100uH	
		< PHOTO INTERRUPTER >	
PH401	8-749-010-19	PHOTO INTERRUPTER GP3S113	
PH402	8-749-010-20	PHOTO INTERRUPTER GP3S114	
		< IC LINK >	
⚠PS121	1-532-675-00	LINK, IC 1.5A	
⚠PS181	1-532-679-00	LINK, IC 0.6A	
⚠PS301	1-532-727-11	LINK, IC 0.25A	
⚠PS401	1-532-637-00	LINK, IC 1.0A	
⚠PS402	1-532-727-11	LINK, IC 0.25A	
		< TRANSISTOR >	
⚠Q121	8-729-140-93	TRANSISTOR 2SB733-34	
Q122	8-729-421-22	TRANSISTOR UN2211	
⚠Q123	8-729-140-98	TRANSISTOR 2SD773-34	
Q125	8-729-025-92	PHOTO TRANSISTOR PT380F	
Q126	8-729-025-92	PHOTO TRANSISTOR PT380F	
Q127	8-729-281-53	TRANSISTOR 2SC1815-GR	
Q202	8-729-421-22	TRANSISTOR UN2211	
Q301	8-729-012-31	TRANSISTOR 2SC4040-TL2-Q	
Q302	8-729-900-51	TRANSISTOR DTA114TK	
Q303	8-729-010-25	TRANSISTOR MSD601-RT1	
Q304	8-729-010-05	TRANSISTOR MSB709-RT1	
Q305	8-729-010-25	TRANSISTOR MSD601-RT1	
Q501	8-729-901-06	TRANSISTOR DTA144EK (E150EE)	
Q504	8-729-901-06	TRANSISTOR DTA144EK	
Q604	8-729-010-05	TRANSISTOR MSB709-RT1	
Q605	8-729-010-05	TRANSISTOR MSB709-RT1	
⚠Q703	8-729-119-76	TRANSISTOR 2SA1175-HFE	
Q712	8-729-119-76	TRANSISTOR 2SA1175-HFE	

The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety. Replace only with part number specified.

Ref. No.	Part No.	Description				Remark
		< RESISTOR >				
R121	1-249-417-11	CARBON	1K	5%	1/4W	F
⚠R122	1-216-430-11	METAL OXIDE	390	5%	1W	F
R123	1-249-412-11	CARBON	390	5%	1/4W	F
R124	1-216-295-00	CONDCTOR, CHIP (2012)				
R125	1-215-881-11	METAL OXIDE	15	5%	2W	F
R126	1-216-089-00	METAL CHIP	47K	5%	1/10W	
R209	1-216-089-00	METAL CHIP	47K	5%	1/10W	
R210	1-216-089-00	METAL CHIP	47K	5%	1/10W	
R211	1-216-089-00	METAL CHIP	47K	5%	1/10W	
R212	1-216-089-00	METAL CHIP	47K	5%	1/10W	
R217	1-216-025-00	METAL CHIP	100	5%	1/10W	
R218	1-216-025-00	METAL CHIP	100	5%	1/10W	
R219	1-216-025-00	METAL CHIP	100	5%	1/10W	
R220	1-216-025-00	METAL CHIP	100	5%	1/10W	
R221	1-216-025-00	METAL CHIP	100	5%	1/10W	
R222	1-216-025-00	METAL CHIP	100	5%	1/10W	
R223	1-216-025-00	METAL CHIP	100	5%	1/10W	
R224	1-216-025-00	METAL CHIP	100	5%	1/10W	
R225	1-216-025-00	METAL CHIP	100	5%	1/10W	
R226	1-216-025-00	METAL CHIP	100	5%	1/10W	
R227	1-216-025-00	METAL CHIP	100	5%	1/10W	
R228	1-216-093-00	METAL CHIP	68K	5%	1/10W	
R229	1-216-069-00	METAL CHIP	6.8K	5%	1/10W	
R230	1-216-031-00	METAL CHIP	180	5%	1/10W	
R232	1-216-025-00	METAL CHIP	100	5%	1/10W	
R233	1-216-049-00	METAL CHIP	1K	5%	1/10W	
R234	1-216-067-00	METAL CHIP	5.6K	5%	1/10W	
R235	1-216-049-00	METAL CHIP	1K	5%	1/10W	
R238	1-216-031-00	METAL CHIP	180	5%	1/10W	
R282	1-249-429-11	CARBON	10K	5%	1/4W	
R302	1-216-081-00	METAL CHIP	22K	5%	1/10W	
R332	1-216-089-00	METAL CHIP	47K	5%	1/10W	
R333	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R334	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R335	1-216-085-00	METAL CHIP	33K	5%	1/10W	
R336	1-216-057-00	METAL CHIP	2.2K	5%	1/10W	
R337	1-216-049-00	METAL CHIP	1K	5%	1/10W	
R363	1-216-001-00	METAL CHIP	10	5%	1/10W	
R370	1-216-097-00	METAL CHIP	100K	5%	1/10W	
R371	1-216-065-00	METAL CHIP	4.7K	5%	1/10W	
R372	1-216-081-00	METAL CHIP	22K	5%	1/10W	
R373	1-216-083-00	METAL CHIP	27K	5%	1/10W	
R374	1-216-075-00	METAL CHIP	12K	5%	1/10W	
R375	1-216-099-00	METAL CHIP	120K	5%	1/10W	
R376	1-216-089-00	METAL CHIP	47K	5%	1/10W	
R378	1-216-041-00	METAL CHIP	470	5%	1/10W	
R379	1-216-109-00	METAL CHIP	330K	5%	1/10W	

Ref. No.	Part No.	Description				Remark
R380	1-216-069-00	METAL CHIP	6.8K	5%	1/10W	
R381	1-216-129-00	METAL CHIP	2.2M	5%	1/10W	
R382	1-216-093-00	METAL CHIP	68K	5%	1/10W	
R383	1-216-071-00	METAL CHIP	8.2K	5%	1/10W	
R384	1-216-093-00	METAL CHIP	68K	5%	1/10W	
R385	1-216-071-00	METAL CHIP	8.2K	5%	1/10W	
R387	1-216-304-11	METAL CHIP	3.3	5%	1/10W	
R388	1-216-295-00	CONDCTOR, CHIP (2012)				
R389	1-216-073-00	METAL CHIP	10K	5%	1/10W	
R390	1-216-049-00	METAL CHIP	1K	5%	1/10W	
R391	1-216-043-00	METAL CHIP	560	5%	1/10W	
R401	1-216-097-00	METAL CHIP	100K	5%	1/10W	
R402	1-216-097-00	METAL CHIP	100K	5%	1/10W	
R403	1-216-059-00	METAL CHIP	2.7K	5%	1/10W	
R404	1-216-031-00	METAL CHIP	180	5%	1/10W	
R405	1-216-065-00	METAL CHIP	4.7K	5%	1/10W	
R406	1-216-089-00	METAL CHIP	47K	5%	1/10W	
R407	1-216-057-00	METAL CHIP	2.2K	5%	1/10W	
R408	1-216-057-00	METAL CHIP	2.2K	5%	1/10W	
R409	1-216-089-00	METAL CHIP	47K	5%	1/10W	
R410	1-216-056-00	METAL GLAZE	2K	5%	1/10W	
R411	1-216-093-00	METAL CHIP	68K	5%	1/10W	
R412	1-216-075-00	METAL CHIP	12K	5%	1/10W	
R413	1-216-083-00	METAL CHIP	27K	5%	1/10W	
R414	1-216-057-00	METAL CHIP	2.2K	5%	1/10W	
R415	1-216-057-00	METAL CHIP	2.2K	5%	1/10W	
R416	1-216-103-91	METAL GLAZE	180K	5%	1/10W	
R417	1-216-079-00	METAL CHIP	18K	5%	1/10W	
R418	1-216-049-00	METAL CHIP	1K	5%	1/10W	
R419	1-249-436-11	CARBON	39K	5%	1/4W	
R420	1-208-782-11	METAL GLAZE	1K	0.50%	1/10W	
R421	1-208-790-11	METAL GLAZE	2.2K	0.50%	1/10W	
R422	1-208-790-11	METAL GLAZE	2.2K	0.50%	1/10W	
R430	1-249-400-11	CARBON	39	5%	1/4W	F
R431	1-249-400-11	CARBON	39	5%	1/4W	F
R432	1-216-057-00	METAL CHIP	2.2K	5%	1/10W	
R433	1-216-068-00	METAL CHIP	6.2K	5%	1/10W	
R435	1-216-093-00	METAL CHIP	68K	5%	1/10W	
R436	1-216-119-00	METAL CHIP	820K	5%	1/10W	
R437	1-216-097-00	METAL CHIP	100K	5%	1/10W	
R438	1-216-097-00	METAL CHIP	100K	5%	1/10W	
R439	1-216-085-00	METAL CHIP	33K	5%	1/10W	
R440	1-216-065-00	METAL CHIP	4.7K	5%	1/10W	
R441	1-216-037-00	METAL CHIP	330	5%	1/10W	
R443	1-216-065-00	METAL CHIP	4.7K	5%	1/10W	
R445	1-216-097-00	METAL CHIP	100K	5%	1/10W	
R446	1-216-121-00	METAL CHIP	1M	5%	1/10W	
R449	1-216-101-00	METAL CHIP	150K	5%	1/10W	

The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety.
Replace only with part number specified.

Ref.No.	Part No.	Description			Remark
R450	1-216-089-00	METAL CHIP	47K	5%	1/10W
R451	1-216-099-00	METAL CHIP	120K	5%	1/10W
R453	1-216-089-00	METAL CHIP	47K	5%	1/10W
R455	1-216-089-00	METAL CHIP	47K	5%	1/10W
R456	1-216-041-00	METAL CHIP	470	5%	1/10W
R458	1-216-089-00	METAL CHIP	47K	5%	1/10W
R459	1-216-089-00	METAL CHIP	47K	5%	1/10W
R460	1-216-089-00	METAL CHIP	47K	5%	1/10W
R461	1-216-089-00	METAL CHIP	47K	5%	1/10W
R470	1-216-073-00	METAL CHIP	10K	5%	1/10W
R471	1-216-073-00	METAL CHIP	10K	5%	1/10W
R481	1-216-295-00	CONDCTOR, CHIP (2012)			
R482	1-216-295-00	CONDCTOR, CHIP (2012)			
R501	1-216-017-00	METAL CHIP	47	5%	1/10W
R502	1-216-073-00	METAL CHIP	10K	5%	1/10W
R505	1-216-049-00	METAL CHIP	1K	5%	1/10W
R506	1-216-049-00	METAL CHIP	1K	5%	1/10W
R507	1-216-033-00	METAL CHIP	220	5%	1/10W
R508	1-216-089-00	METAL CHIP	47K	5%	1/10W
R509	1-216-089-00	METAL CHIP	47K	5%	1/10W
R510	1-216-049-00	METAL CHIP	1K	5%	1/10W
R511	1-216-025-00	METAL CHIP	100	5%	1/10W
R512	1-216-053-00	METAL CHIP	1.5K	5%	1/10W
R513	1-216-025-00	METAL CHIP	100	5%	1/10W
R517	1-216-081-00	METAL CHIP	22K	5%	1/10W
R518	1-216-083-00	METAL CHIP	27K	5%	1/10W (E150EE)
R521	1-216-001-00	METAL CHIP	10	5%	1/10W
R522	1-216-109-00	METAL CHIP	330K	5%	1/10W
R523	1-216-113-00	METAL CHIP	470K	5%	1/10W
R524	1-247-887-00	CARBON	220K	5%	1/4W
R525	1-216-077-00	METAL CHIP	15K	5%	1/10W
R538	1-216-065-00	METAL CHIP	4.7K	5%	1/10W
R539	1-216-065-00	METAL CHIP	4.7K	5%	1/10W
R546	1-216-049-00	METAL CHIP	1K	5%	1/10W
R547	1-216-089-00	METAL CHIP	47K	5%	1/10W
R550	1-216-295-00	CONDCTOR, CHIP (2012)			
R551	1-216-295-00	CONDCTOR, CHIP (2012)			
R552	1-216-295-00	CONDCTOR, CHIP (2012)			
R553	1-216-295-00	CONDCTOR, CHIP (2012)			
R554	1-216-295-00	CONDCTOR, CHIP (2012)			
R560	1-249-436-11	CARBON	39K	5%	1/4W
R561	1-216-065-00	METAL CHIP	4.7K	5%	1/10W
R562	1-216-049-00	METAL CHIP	1K	5%	1/10W
R590	1-216-069-00	METAL CHIP	6.8K	5%	1/10W (E150EE)
R591	1-216-069-00	METAL CHIP	6.8K	5%	1/10W (E150EE)
R592	1-216-069-00	METAL CHIP	6.8K	5%	1/10W (E150EE)
R593	1-216-069-00	METAL CHIP	6.8K	5%	1/10W (E150EE)
R594	1-216-069-00	METAL CHIP	6.8K	5%	1/10W (E150EE)
R595	1-249-423-11	CARBON	3.3K	5%	1/4W F (E150EE)

Ref.No.	Part No.	Description			Remark
R596	1-216-061-00	METAL CHIP	3.3K	5%	1/10W (E150EE)
R597	1-216-061-00	METAL CHIP	3.3K	5%	1/10W (E150EE)
R598	1-216-065-00	METAL CHIP	4.7K	5%	1/10W (E150EE)
R599	1-216-063-00	METAL CHIP	3.9K	5%	1/10W (E150EE)
R613	1-216-295-00	CONDCTOR, CHIP (2012)			
R614	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R615	1-216-053-00	METAL CHIP	1.5K	5%	1/10W
R616	1-216-069-00	METAL CHIP	6.8K	5%	1/10W
R617	1-216-049-00	METAL CHIP	1K	5%	1/10W
R618	1-216-045-00	METAL CHIP	680	5%	1/10W
R619	1-216-089-00	METAL CHIP	47K	5%	1/10W
R620	1-216-065-00	METAL CHIP	4.7K	5%	1/10W
R621	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R622	1-216-049-00	METAL CHIP	1K	5%	1/10W
R623	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R625	1-216-295-00	CONDCTOR, CHIP (2012)			
R704	1-216-025-00	METAL CHIP	100	5%	1/10W
R705	1-216-089-00	METAL CHIP	47K	5%	1/10W
R719	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R730	1-215-393-00	METAL	68	1%	1/6W
R731	1-247-811-31	CARBON	150	5%	1/4W
R732	1-216-295-00	CONDCTOR, CHIP (2012)			
R733	1-249-408-11	CARBON	180	5%	1/4W F
R735	1-216-023-00	METAL CHIP	82	5%	1/10W
R738	1-216-043-00	METAL CHIP	560	5%	1/10W
R741	1-216-295-00	CONDCTOR, CHIP (2012)			
R801	1-216-073-00	METAL CHIP	10K	5%	1/10W
R802	1-216-073-00	METAL CHIP	10K	5%	1/10W
R804	1-216-073-00	METAL CHIP	10K	5%	1/10W
R805	1-216-295-00	CONDCTOR, CHIP (2012)			
R806	1-216-295-00	CONDCTOR, CHIP (2012)			
		< COMPOSITION CIRCUIT BLOCK >			
RB201	1-219-386-11	NETWORK, RESISTOR (CHIP TYPE)			
		< VARIABLE RESISTOR >			
RV301	1-238-019-11	RES, ADJ, CARBON 47K			
RV502	1-238-019-11	RES, ADJ, CARBON 47K			
		< SWITCH >			
S201	1-571-532-32	SWITCH, TACTIL (ON/STANDBY)			
S202	1-571-532-32	SWITCH, TACTIL (EJECT)			
S203	1-571-532-32	SWITCH, TACTIL (PROGRAM +)			
S204	1-571-532-32	SWITCH, TACTIL (PROGRAM -)			
S205	1-571-532-32	SWITCH, TACTIL (● REC)			
S206	1-571-532-32	SWITCH, TACTIL (❚❚ PAUSE)			
S207	1-571-532-32	SWITCH, TACTIL (■ STOP)			
S215	1-572-907-11	SWITCH, SLIDE (COLOR SYSTEM)			

MA-212 **PS-338** **SW-241** **VI-134**

Ref. No.	Part No.	Description				Remark
S216	1-572-984-21	SWITCH, SLIDE (NTSC PB)				
S401	1-570-953-11	SWITCH, PUSH (1 KEY) (CASSETTE IN/REC PROOF)				
SW701	1-571-588-11	SWITCH, SLIDE (TV SYSTEM)				
		< TRANSFORMER >				
T301	1-423-414-11	TRANSFORMER, BIAS OSCILLATION				
		< TUNER >				
⚠TU701	1-693-239-11	TUNER, RF MOD/IF				
		< VIBRATOR >				
X501	1-760-494-11	VIBRATOR, CRYSTAL (16MHz)				
X502	1-579-463-11	VIBRATOR, CRYSTAL (32.768KHz)				
X602	1-577-289-11	VIBRATOR, CRYSTAL (17.73447MHz)				
**********						
⚠*	A-6722-449-A	PS-338 BOARD, COMPLETE (X312)				
		**********				
⚠*	A-6794-003-A	PS-338 BOARD, COMPLETE (E150EE)				
		**********				
		(Ref. No. 3,000 Series)				
	1-533-293-11	FUSE HOLDER				
		< CAPACITOR >				
⚠C101	1-104-705-11	FILM	0.1uF	20%	250V	(X312)
⚠C101	1-104-706-11	FILM	0.22uF	20%	250V	
⚠C102	1-104-705-11	FILM	0.1uF	20%	250V	
⚠C103	1-107-405-11	ELECT	68uF	20%	400V	
⚠C103	1-125-497-11	ELECT	100uF			(X312)
⚠C104	1-161-741-00	CERAMIC	0.001uF	10%	400V	
⚠C105	1-161-741-00	CERAMIC	0.001uF	10%	400V	
⚠C106	1-161-741-00	CERAMIC	0.001uF	10%	400V	
⚠C107	1-161-741-00	CERAMIC	0.001uF	10%	400V	
⚠C108	1-161-741-00	CERAMIC	0.001uF	10%	400V	
C121	1-124-480-11	ELECT	470uF	20%	25V	
C122	1-124-472-11	ELECT	470uF	20%	10V	
		< CONNECTOR >				
⚠CN101	1-251-134-11	INLET, AC (NONPOLAR) (AC IN~)				
CN102	1-766-919-11	SOCKET, CONNECTOR (PC BOARD) 6P				
		< COMPOSITION CIRCUIT BLOCK >				
⚠CP101	1-413-897-11	POWER BLOCK (E150EE)				
⚠CP101	1-413-896-11	POWER BLOCK (X312)				

Ref. No.	Part No.	Description				Remark
		< DIODE >				
⚠D101	8-719-510-06	DIODE S1WB60				
		< FUSE >				
⚠F101	1-576-228-11	FUSE (H.B.C.) (T2A 250V)				
		< COIL >				
⚠L121	1-403-588-11	CIL, CHOKE 22uH				
⚠L122	1-403-588-11	CIL, CHOKE 22uH				
		< LINE FILTER >				
⚠LF101	1-403-599-11	FILTER, LINE 33mH (E150EE)				
⚠LF101	1-424-117-11	FILTER, LINE (X312)				
⚠LF102	1-403-599-11	FILTER, LINE 33mH (E150EE)				
⚠LF102	1-424-117-11	FILTER, LINE (X312)				
		< RESISTOR >				
⚠R101	1-214-947-00	METAL	2.7M	1%	1/2W	
**********						
*	1-654-382-11	SW-241 BOARD				
		**********				
		(Ref. No. 2,000 Series)				
		< CONNECTOR >				
CN251	1-506-484-11	PIN, CONNECTOR 5P				
		< SWITCH >				
S251	1-571-977-11	SWITCH, TACTIL (▶▶ FF)				
S252	1-571-977-11	SWITCH, TACTIL (▷ PLAY)				
S253	1-571-977-11	SWITCH, TACTIL (◀◀ REW)				
**********						
*	A-6727-603-A	VI-134 BOARD, COMPLETE				
		**********				
		(Ref. No. 1,000 Series)				
		< CAPACITOR >				
C001	1-162-219-31	CERAMIC	68PF	5%	50V	
C002	1-163-031-11	CERAMIC CHIP	0.01uF		50V	
C003	1-163-113-00	CERAMIC CHIP	68PF	5%	50V	
C004	1-124-126-00	ELECT	47uF	20%	10V	
C005	1-124-126-00	ELECT	47uF	20%	10V	
C006	1-163-031-11	CERAMIC CHIP	0.01uF		50V	
C007	1-124-927-11	ELECT	4.7uF	20%	100V	
C008	1-163-031-11	CERAMIC CHIP	0.01uF		50V	
C101	1-163-123-00	CERAMIC CHIP	180PF	5%	50V	
C102	1-163-107-00	CERAMIC CHIP	39PF	5%	50V	

The components identified by mark ⚠ or dotted line with mark. ⚠ are critical for safety. Replace only with part number specified.

Ref. No.	Part No.	Description			Remark
C104	1-163-101-00	CERAMIC CHIP	22PF	5%	50V
C109	1-124-126-00	ELECT	47uF	20%	10V
C110	1-124-126-00	ELECT	47uF	20%	10V
C111	1-124-907-11	ELECT	10uF	20%	50V
C112	1-124-126-00	ELECT	47uF	20%	10V
C113	1-124-126-00	ELECT	47uF	20%	10V
C115	1-124-126-00	ELECT	47uF	20%	10V
C116	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C501	1-124-126-00	ELECT	47uF	20%	10V
C502	1-162-306-11	CERAMIC	0.01uF	30%	16V
C503	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C504	1-163-121-00	CERAMIC CHIP	150PF	5%	50V
C505	1-163-097-00	CERAMIC CHIP	15PF	5%	50V
C506	1-163-113-00	CERAMIC CHIP	68PF	5%	50V
C801	1-163-033-00	CERAMIC CHIP	0.022uF		50V
C802	1-163-033-00	CERAMIC CHIP	0.022uF		50V
C806	1-163-117-00	CERAMIC CHIP	100PF	5%	50V
C807	1-165-319-11	CERAMIC CHIP	0.1uF		50V
C808	1-124-584-00	ELECT	100uF	20%	10V
C809	1-165-319-11	CERAMIC CHIP	0.1uF		50V
C810	1-124-584-00	ELECT	100uF	20%	10V
C811	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C813	1-164-336-11	CERAMIC CHIP	0.33uF		25V
C814	1-164-159-11	CERAMIC	0.1uF		50V
C815	1-164-159-11	CERAMIC	0.1uF		50V
C817	1-165-319-11	CERAMIC CHIP	0.1uF		50V
C818	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C822	1-163-129-00	CERAMIC CHIP	330PF	5%	50V
C826	1-124-229-00	ELECT	33uF	20%	10V
C827	1-165-319-11	CERAMIC CHIP	0.1uF		50V
C829	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C830	1-163-107-00	CERAMIC CHIP	39PF	5%	50V
C836	1-126-160-11	ELECT	1uF	20%	50V
C838	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C839	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C840	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C883	1-216-025-00	METAL CHIP	100	5%	1/10W
C884	1-216-025-00	METAL CHIP	100	5%	1/10W
C901	1-163-109-00	CERAMIC CHIP	47PF	5%	50V
C902	1-163-031-11	CERAMIC CHIP	0.01uF		50V
C903	1-163-105-00	CERAMIC CHIP	33PF	5%	50V
C905	1-163-113-00	CERAMIC CHIP	68PF	5%	50V
C906	1-163-111-00	CERAMIC CHIP	56PF	5%	50V
C907	1-163-105-00	CERAMIC CHIP	33PF	5%	50V
C921	1-124-126-00	ELECT	47uF	20%	10V
C922	1-163-031-11	CERAMIC CHIP	0.01uF		50V

Ref. No.	Part No.	Description			Remark
		< FILTER >			
CF001	1-527-943-00	FILTER, CERAMIC			
		< CONNECTOR >			
CN001	1-573-826-11	CONNECTOR, BOARD TO BOARD 12P			
CN002	1-766-720-11	CONNECTOR, BOARD TO BOARD 17P			
CN801	1-563-585-11	CONNECTOR, FLEXIBLE 8P			
* CN802	1-564-029-00	PIN, CONNECTOR 4P			
		< DIODE >			
D103	8-719-911-19	DIODE 1SS119			
D802	8-719-911-19	DIODE 1SS119			
D804	8-719-911-19	DIODE 1SS119			
		< IC >			
IC001	8-759-996-63	IC BA7025L (SECAM DET)			
IC101	1-467-887-11	IC YC MODULE 2, (PAL) (Y/C PROCESS)			
IC801	8-759-267-77	IC HA118291ANT (VIDEO REC/PB AMP)			
		< JUMPER RESISTOR >			
JR001	1-216-296-00	METAL CHIP	0	5%	1/8W
JR002	1-216-296-00	METAL CHIP	0	5%	1/8W
JR003	1-216-296-00	METAL CHIP	0	5%	1/8W
JR004	1-216-296-00	METAL CHIP	0	5%	1/8W
JR005	1-216-295-00	CONDCTOR, CHIP (2012)			
JR006	1-216-295-00	CONDCTOR, CHIP (2012)			
JR007	1-216-295-00	CONDCTOR, CHIP (2012)			
JR008	1-216-296-00	METAL CHIP	0	5%	1/8W
JR009	1-216-296-00	METAL CHIP	0	5%	1/8W
JR010	1-216-296-00	METAL CHIP	0	5%	1/8W
JR011	1-216-296-00	METAL CHIP	0	5%	1/8W
JR012	1-216-296-00	METAL CHIP	0	5%	1/8W
JR013	1-216-295-00	CONDCTOR, CHIP (2012)			
JR014	1-216-296-00	METAL CHIP	0	5%	1/8W
JR015	1-216-295-00	CONDCTOR, CHIP (2012)			
		< COIL >			
L001	1-414-189-31	INDUCTOR 100uH			
L103	1-414-189-31	INDUCTOR 100uH			
L104	1-408-982-11	INDUCTOR 100uH			
L105	1-408-982-11	INDUCTOR 100uH			
L106	1-414-189-31	INDUCTOR 100uH			
L501	1-408-985-21	INDUCTOR 180uH			
L502	1-408-982-11	INDUCTOR 100uH			
L503	1-410-512-11	INDUCTOR 18uH			
L801	1-410-525-11	INDUCTOR 220uH			
L803	1-414-189-31	INDUCTOR 100uH			
L804	1-414-189-31	INDUCTOR 100uH			

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Ref. No.	Part No.	Description	Remark
L810	1-410-524-41	INDUCTOR 180uH	
L812	1-414-189-31	INDUCTOR 100uH	
L901	1-410-511-11	INDUCTOR 15uH	
L902	1-410-511-11	INDUCTOR 15uH	
L903	1-408-982-11	INDUCTOR 100uH	
L905	1-410-515-11	INDUCTOR 33uH	
L906	1-410-509-11	INDUCTOR 10uH	
L907	1-410-516-11	INDUCTOR 39uH	
		< TRANSISTOR >	
Q001	8-729-010-25	TRANSISTOR MSD601-RT1	
Q105	8-729-901-06	TRANSISTOR DTA144EK	
Q106	8-729-421-19	TRANSISTOR UN2213	
Q108	8-729-901-06	TRANSISTOR DTA144EK	
Q351	8-729-421-19	TRANSISTOR UN2213	
Q501	8-729-230-49	TRANSISTOR 2SC2712-YG	
Q851	8-729-421-19	TRANSISTOR UN2213	
Q852	8-729-421-19	TRANSISTOR UN2213	
⚠Q853	8-729-119-78	TRANSISTOR 2SC2785-HFE	
Q854	8-729-010-25	TRANSISTOR MSD601-RT1	
Q855	8-729-230-49	TRANSISTOR 2SC2712-YG	
Q861	8-729-216-21	TRANSISTOR 2SA1162Y-TE85L	
Q862	8-729-230-49	TRANSISTOR 2SC2712-YG	
Q901	8-729-216-21	TRANSISTOR 2SA1162Y-TE85L	
Q904	8-729-230-49	TRANSISTOR 2SC2712-YG	
Q905	8-729-421-19	TRANSISTOR UN2213	
Q906	8-729-230-49	TRANSISTOR 2SC2712-YG	
Q907	8-729-421-19	TRANSISTOR UN2213	
		< RESISTOR >	
R001	1-249-433-11	CARBON 22K 5% 1/4W	
R002	1-216-081-00	METAL CHIP 22K 5% 1/10W	
R003	1-249-421-11	CARBON 2.2K 5% 1/4W	F
R004	1-216-049-00	METAL CHIP 1K 5% 1/10W	
R005	1-216-073-00	METAL CHIP 10K 5% 1/10W	
R006	1-216-065-00	METAL CHIP 4.7K 5% 1/10W	
R007	1-216-109-00	METAL CHIP 330K 5% 1/10W	
R101	1-216-053-00	METAL CHIP 1.5K 5% 1/10W	
R102	1-208-798-11	METAL GLAZE 4.7K 0.50% 1/10W	
R103	1-216-295-00	CONDCTOR, CHIP (2012)	
R107	1-216-065-00	METAL CHIP 4.7K 5% 1/10W	
R110	1-216-049-00	METAL CHIP 1K 5% 1/10W	
R112	1-216-092-00	METAL GLAZE 62K 5% 1/10W	
R116	1-216-065-00	METAL CHIP 4.7K 5% 1/10W	
R117	1-216-079-00	METAL CHIP 18K 5% 1/10W	
R122	1-216-073-00	METAL CHIP 10K 5% 1/10W	
R127	1-216-295-00	CONDCTOR, CHIP (2012)	
R130	1-216-081-00	METAL CHIP 22K 5% 1/10W	
R131	1-216-081-00	METAL CHIP 22K 5% 1/10W	
R134	1-216-025-00	METAL CHIP 100 5% 1/10W	
R353	1-249-417-11	CARBON 1K 5% 1/4W	F
R501	1-216-045-00	METAL CHIP 680 5% 1/10W	
R502	1-216-089-00	METAL CHIP 47K 5% 1/10W	
R503	1-216-083-00	METAL CHIP 27K 5% 1/10W	
R504	1-216-049-00	METAL CHIP 1K 5% 1/10W	
R505	1-216-049-00	METAL CHIP 1K 5% 1/10W	
R506	1-216-047-00	METAL CHIP 820 5% 1/10W	
R801	1-216-021-00	METAL CHIP 68 5% 1/10W	
R802	1-216-037-00	METAL CHIP 330 5% 1/10W	
R805	1-211-952-11	METAL GLAZE 10 0.50% 1/10W	
R806	1-216-021-00	METAL CHIP 68 5% 1/10W	
R811	1-216-037-00	METAL CHIP 330 5% 1/10W	
R822	1-216-073-00	METAL CHIP 10K 5% 1/10W	
R823	1-216-081-00	METAL CHIP 22K 5% 1/10W	
R835	1-216-050-00	METAL GLAZE 1.1K 5% 1/10W	
R836	1-247-838-00	CARBON 2K 5% 1/4W	
R851	1-249-423-11	CARBON 3.3K 5% 1/4W	F
R852	1-216-059-00	METAL CHIP 2.7K 5% 1/10W	
R853	1-216-079-00	METAL CHIP 18K 5% 1/10W	
R856	1-247-807-31	CARBON 100 5% 1/4W	
R858	1-216-065-00	METAL CHIP 4.7K 5% 1/10W	
R859	1-216-089-00	METAL CHIP 47K 5% 1/10W	
R861	1-249-419-11	CARBON 1.5K 5% 1/4W	F
R862	1-216-061-00	METAL CHIP 3.3K 5% 1/10W	
R863	1-216-047-00	METAL CHIP 820 5% 1/10W	
R864	1-216-057-00	METAL CHIP 2.2K 5% 1/10W	
R865	1-249-417-11	CARBON 1K 5% 1/4W	F
R866	1-216-075-00	METAL CHIP 12K 5% 1/10W	
R901	1-216-057-00	METAL CHIP 2.2K 5% 1/10W	
R902	1-216-067-00	METAL CHIP 5.6K 5% 1/10W	
R903	1-216-063-00	METAL CHIP 3.9K 5% 1/10W	
R904	1-216-057-00	METAL CHIP 2.2K 5% 1/10W	
R905	1-216-039-00	METAL CHIP 390 5% 1/10W	
R906	1-216-047-00	METAL CHIP 820 5% 1/10W	
R908	1-216-043-00	METAL CHIP 560 5% 1/10W	
R909	1-249-417-11	CARBON 1K 5% 1/4W	F
R910	1-216-041-00	METAL CHIP 470 5% 1/10W	
R911	1-216-046-00	METAL CHIP 750 5% 1/10W	
R912	1-249-421-11	CARBON 2.2K 5% 1/4W	F
R913	1-216-037-00	METAL CHIP 330 5% 1/10W	
R914	1-216-049-00	METAL CHIP 1K 5% 1/10W	
R915	1-216-049-00	METAL CHIP 1K 5% 1/10W	
R916	1-249-429-11	CARBON 10K 5% 1/4W	
R917	1-216-039-00	METAL CHIP 390 5% 1/10W	
		< VARIABLE RESISTOR >	
RV001	1-241-760-11	RES, ADJ, CARBON 470	

The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safety. Replace only with part number specified.

Ref. No.	Part No.	Description	Remark
		< TRANSFORMER >	
T001	1-409-467-11	COIL (TRAP 7.8K)	

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MISCELLANEOUS
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716	A-6736-103-A	ACE BLOCK ASSY	
720	1-500-144-11	HEAD, FE	
726	1-506-485-11	PIN, CONNECTOR 6P	
M901	1-759-034-11	DRUM ASSY (DZH-72A-R)	
M902	1-698-409-11	MOTOR, DC	
M903	X-3943-883-1	MOTOR ASSY, CAM	
S901	1-762-076-11	SWITCH, ROTARY	

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ACCESSORIES & PACKING MATERIALS
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⚠	1-569-008-11	ADAPTER, CONVERSION 2P (X312:ME/SG)
⚠	1-575-131-11	CORD, POWER SUPPLY
	1-696-593-11	CORD, CONNECTION (PAL) (AERIAL) 1.5m
	3-759-523-11	MANUAL, INSTRUCTION (ENGLISH)
	3-759-523-51	MANUAL, INSTRUCTION (CHINESE) (X312:PS)
	3-759-523-61	MANUAL, INSTRUCTION (ARABIC) (X312:ME/SG)
	3-759-523-71	MANUAL, INSTRUCTION (CZECK, POLSH, RUSSIAN) (E150EE)
	3-759-523-81	MANUAL, INSTRUCTION (PERSIAN) (X312:SG)
*	3-961-188-01	INDIVIDUAL CARTON (X312:PS)
*	3-961-188-11	INDIVIDUAL CARTON (X312:SG)
*	3-961-188-21	INDIVIDUAL CARTON (X312:ME)
*	3-961-252-01	INDIVIDUAL CARTON (E150EE)
*	3-961-424-01	CUSHION (UPPER)
*	3-961-425-01	CUSHION (LOWER)
*	3-961-581-01	SHEET, PROTECTION

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****
HARDWARE LIST
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#1	7-685-647-79	SCREW +BVTP 3X10 TYPE2 IT-3
#2	7-685-648-79	SCREW +BVTP 3X12 TYPE2 IT-3
#21	7-621-255-15	SCREW +B 2X3
#22	7-682-547-04	SCREW +P 3X6
#23	7-682-645-01	SCREW +PS 3X4
#24	7-685-646-79	SCREW (3X8)
#25	7-624-190-61	STOP RING 2.4, TYPE-CS
#26	7-624-106-04	STOP RING 3.0, TYPE -E

The components identified by mark ⚠ or dotted line with mark. ⚠ are critical for safety. Replace only with part number specified.

6-1. SYSTEM CONTROL – MECHANISM BLOCK INTERFACE (MA-212 BOARD IC501)

Signal	Pin No.	I/O	EJECTED	CASSETTE LOADING	CASSETTE UNLOAD-ING	TAPE THREAD-ING	TAPE UNTHREAD-ING	STOP	FF	REW	PB	REC
CW	MA-212 Board IC501 ㊶	O	L	H	L	H	L	L	L	L	L	L
CAM	MA-212 Board IC501 ㊷	O	L	L	L	H	L	L	L	L	L	L
MODE 1	MA-212 Board IC501 ㊸	I	L	L	L	H	H	H	H	H	H	H
MODE 2	MA-212 Board IC501 ㊹	I	L	H	L	L	H	L	L	L	L	L
MODE 3	MA-212 Board IC501 ㊺	I	H	H	H	L	H	H	H	H	L	L
MODE 4	MA-212 Board IC501 ㊻	I	H	H	H	H	H	H	H	H	H	H
REC SAF	MA-212 Board IC501 ㊼	I	L	*1	*1	*1	*1	*1	*1	*1	*1	*1
T REEL FG	MA-212 Board IC501 ㊽	I	H/L	H/L	H/L	H/L	H/L	H/L	*2	*2	*2	*2
S REEL FG	MA-212 Board IC501 ㊾	I	H/L	H/L	H/L	*2	*2	H/L	*2	*2	*2	*2
END LED	MA-212 Board IC501 ㊿	O	*3	*3	*3	*3	*3	*3	*3	*3	*3	*3
CAP TRQ1	MA-212 Board IC501 ㊿	O	H	H	H	H	H	H	H	H	H	H
CAP TRQ2	MA-212 Board IC501 ㊿	O	H	H	H	H	H	H	H	H	H	H
$\overline{\text{CAP STOP}}$	MA-212 Board IC501 ㊿	O	L	*5	*5	*5	*5	L	*5	*5	*5	*5
T SENS	MA-212 Board IC501 ㊿	I	*3	*3	*3	*6	*6	*6	*6	*6	*6	*6
S SENS	MA-212 Board IC501 ㊿	I	*3	*3	*3	*6	*6	*6	*6	*6	*6	*6

*1. "L" when erasing protection tab is bent. "H" when not bent.
*2. Pulse of period in proportion to reel rotating speed.
*3. Approx. 2 msec period "H" pulse.
*4. pulse.
*5. 3 value output of "H", "L" and "Hi-Z (2.5 V)".
*6. Nomally "L". 2 msec period "H" pulse when tape top or tape end is detected.

6-2. SYSTEM CONTROL – SERVO PERIPHERAL CIRCUIT INTERFACE (MA-212 BOARD IC501)

Signal	Pin No.	I/O	STOP	FF	REW	TAPE THREAD-ING	TAPE UNTHREAD-ING	PB	REC
REC CTL	MA-212 Board IC501 ⑦	O	*14	*14	*14	*14	*14	*14	*1
STEP PLS	MA-212 Board IC501 ⑭	O	L	*2	*2	*2	*2	*2	*2
RF SW POSI *4	MA-212 Board IC501 ⑫	I							
$\overline{\text{PB CTL}}$	MA-212 Board IC501 ⑰	I	H	*5	*5			*1	*1
DRUM PG	MA-212 Board IC501 ⑩	I	*6	*6	*6	*6	*6	*6	*6
DRUM FG	MA-212 Board IC501 ⑨	I	*7	*7	*7	*7	*7	*7	*7
CAP FG	MA-212 Board IC501 ⑱	I	H/L	*8	*8	*9	*9	*8	*8
CAP RVS	MA-212 Board IC501 ⑰	O	H/L	L	H	L	H	L	L
CAP DA *14	MA-212 Board IC501 ⑬	O	*11	*11	*11	*11	*11	*12	*12
DRUM DA *4	MA-212 Board IC501 ⑭	O	*13	*13	*13	*13	*13	*13	*13
CTL STEP	MA-212 Board IC501 ⑮	O	L	L	L	L	L	L	L

*1. 30 Hz pulse.
*2. 3 value output of "H", "L" and Hi-Z (2.5 V).
*3. Unstable period Pulse.
*4. Input terminal for video switching position adjustment.
*5. Pulse of period in proportion to tape speed.
*6. 30 Hz "H" pulse.
*7. 720 Hz pulse.
*8. Pulse of period in proportion to tape speed.
*9. Unstable period pulse
*10. Pulse at tape running.
*11. Approx. 2 msec period "H" or "L" pulse.
*12. Approx. 1.5 msec period "H" or "L" pulse.
*13. Approx. 3 msec period "H" or "L" pulse.
*14. Hi-Z (2.5 V).

6-3. SYSTEM CONTROL – SYSTEM CONTROL PERIPHERAL CIRCUIT INTERFACE (MA-212 BOARD IC501)

Signal	Pin No.	I/O	I/O level
$\overline{\text{ASURA RESET}}$	MA-212 Board IC501 ㊸	I	Normally "H". "L" when service interruption is detected or restored.
$\overline{\text{ASURA-CS}}$	MA-212 Board IC501 ㊹	I	Always "H".
S IN0	MA-212 Board IC501 ㊺	I	Serial communication data from timer microprocessor.
S OOT0	MA-212 Board IC501 ㊻	O	Serial communication data to timer microprocessor.
$\overline{\text{S CLK O}}$	MA-212 Board IC501 ㊼	I	Serial communication clock with timer microprocessor.

6-4. SYSTEM CONTROL – INPUT SELECTION BLOCK INTERFACE (MA-212 BOARD IC501)

Signal	Pin No.	I/O	I/O level
LINE 1	MA-212 Board IC501 ⑱	O	Input select control signal.

6-5. SYSTEM CONTROL – VIDEO BLOCK INTERFACE (MA-212 BOARD IC501)

Signal	Pin No.	I/O	STOP/ FF/ REW	TAPE LOADING	TAPE UNLOAD-ING	PB	REC
$\overline{\text{V-PB}}$	MA-212 Board IC501 ⑩	O	H	H	H	L	H
HEAD CONT	MA-212 Board IC501 ⑪	O	L	L	L	L	H
RF SWP.	MA-212 Board IC501 ①	O	*2	*2	*2	*2	*2
Q VD	MA-212 Board IC501 ②	O	L	L	L	*3	L
$\overline{\text{SP}}$	MA-212 Board IC501 ⑩	O	*5	*5	*5	*6	*5
REC. P	MA-212 Board IC501 ⑤	O	L	L	L	L	L
REC	MA-212 Board IC501 ⑥	O	L	L	L	L	H
V SYNC	MA-212 Board IC501 ㊺	I	*7	*7	*7	*7	*7

*1. "H" when tape stops. "L" when tape runs (approx. for 33 msec).
*2. Syncronized with drum rotation. 30 Hz 50% duty pulse.
*3. Normally "L". "H" when video signal is not generated.
*4. V period "H" pulse.
*5. SP mode: "L", SP mode: "L".
*6. Selected by tape recording mode.
*7. Composite sync signal (positive).
*8. "H" when menu screen or blue back screen.

6-6. SYSTEM CONTROL – AUDIO BLOCK INTERFACE (MA-212 BOARD IC501)

Signal	Pin No.	I/O	STOP/ FF/ REW	TAPE LOADING	TAPE UNLOAD-ING	PB	REC
NA PB	MA-212 Board IC501 ㊾	O	L	L	L	H	L
A MUTE	MA-212 Board IC501 ㊺	O	L	L	L	L	L
NA REC P	MA-212 Board IC501 ⑬	O	L	L	I	L	H
$\overline{\text{SP}}$	MA-212 Board IC501 ⑲	O	*1	*1	*1	*2	*1

*1. SP mode: "L".
*2. Selected by tape recording mode. SP mode: "L".

6-7. SERVO, SYSTEM CONTROL MICROPROCESSOR PIN FUNCTION (MA-212 BOARD IC501)

Pin. No.	Port	I/O	Name	Function
1	pb5/ppo13	O	RF SWP	Video switching pulse output.
2	pb4/ppo12	O	Q VD	Quasi VD pulse output.
3	pb3/ppo11	O	Q HD ENABLE	Quasi HD control.
4	pb2	O	RENTAL	Rental picture control.
5	pb1	O	REC P	"H" output when video REC.
6	pb0	O	REC	"H" output when REC.
7	pc7	O	REC CTL	REC CTL output.
8	pc6	I	CAP TRQ3	Capstan motor drive signal.
9	pc5	O	ORC ON	Video control signal. "H" during APC/OPC data measuring only.
10	pc4	O	SP	"L" when SP mode.
11	pc3	I	POWER FAIL	"L" when AC OFF.
12	pc2	O	LP	Not used.
13	pc1	O	NA REC P	Normal sudio recording control. "H" when REC mode.
14	pc0	O	STEP PLS	Step pulse output during SLOW.
15	pj7	I	S SENS	Supply side end sensor input.
16	pj6	I	T SENS	Take-up side end sensor input.
17	pj5	O	HEAD CONT	Head amp IC control signal.
18	pj4	O	LINE 1	Line select signal. "H" when LINE input.
19	pj3	I/O	3.58 MHz (PDC RESET)	NT PB mode control. "H" when 3.58 MHz mode.
20	pj2	I/O	NT JUDGE (PDS CS)	"H" when NTSC mode, "L" when PAL mode.
21	pj1	I/O	SECAM	Not used.
22	pj0	I/O	ME SECAM	"H" when ME SECAM mode, "L" when else.
23	pd7	I	DEF	APC/OPC control signal. "L" when default level.
24	pd6	O	TU CLOCK	Serial clock signal for TUNER.
25	pd5	O	TU DATA	Serial data signal for TUNER.
26	pd4	O	TU ENABLE	Serial enable signal for TUNER.
27	pd3	O	DA5	APC/OPC control signal.
28	pd2	O	DA6	APC/OPC control signal.
29	pd1	O	DA7	APC/OPC control signal.
30	pd0	O	DA8	APC/OPC control signal.
31	ph7	O	LOAD CAM	CAM motor control signal.
32	ph6	O	EEP RESET	EEPROM reset signal.
33	ph5	O	EEP CS	EEPROM chip select signal. "L" when active.
34	ph4	O	CAP STOP	Capstan motor drive signal. "L" when STOP.
35	ph3	I	CAP TRQ1	Capstan motor drive signal.
36	ph2	I	CAP TRQ2	Capstan motor drive signal.
37	ph1	O	END LED	Pulse signal for END sensor.
38	ph0	O	OSD ENABLE	OSD enable signal.
39	mp	I	MP (VSS)	Fixed "L" level.
40	$\overline{res}$	I	ASURA RESET	ASURA reset signal. "L" when reset.

Pin. No.	Port	I/O	Name	Function
41	vss	I	VSS	GND
42	xtal	O	XTAL	System clock 16 MHz.
43	extal	I	EXTAL	System clock 16 MHz.
44	$\overline{cs0}$	O	ASURA CS	ASURA chip select signal.
45	si0	I	S IN 0 (TO ASURA)	Serial input signal.
46	so0	O	S OUT 0 (FROM ASURA)	Serial output signal.
47	$\overline{sck0}$	I	S CLK 0 (TO ASURA)	Serial clock signal.
48	pf7/an11	O	NTSC	"L" when NTSC mode.
49	pf6/an10	O	ENV CONT	Envelope level control signal.
50	pf5/an9	O	LP JOG	"H" when PAL LP and JOG mode.
51	pf4/an8	O	SYS CHECK	System check signal.
52	avss	I	AVSS	GND
53	avref	I	AVREF	A/D port reference input. (Equal level to VDD)
54	avdd	I	AVDD	VDD
55	pf3/an7	I	MODE 4	Mecha position signal input.
56	pf2/an6	I	MODE 3	Mecha position signal input.
57	pf1/an5	I	MODE 2	Mecha position signal input.
58	pf0/an4	I	MODE 1	Mecha position signal input.
59	an3	I	DEST/DEW	Destination input. Analog input.
60	an2	I	RF ENV	RF level input. ANALOG input.
61	an1	I	AFT	AFT signal input. ANALOG input.
62	an0	I	RF SW POSI	RF switching position signal input. ANALOG input.
63	pg7	I	S REEL	Supply reel FG signal input.
64	pg6	I	T REEL	Take-up reel FG signal input.
65	pg5	I	H DET	H-sync DETECT input.
66	pg4/sync	I	V SYNC	V-sync signal input.
67	pg3/pbctl	I	PB CTL	Playback Control signal input.
68	pg2/dpg	I	DRM PG	DRUM PG signal input.
69	pg1/dfg	I	DRM FG	DRUM FG signal input.
70	pg0/cfg	I	CAP FG	CAPSTAN FG signal input.
71	pe7	O	JOG	"L" when jog mode.
72	pe6	O	CAP RVS	"H" when capstan rotation is reverse.
73	pe5	O	CAP DA	CAPSTAN D/A output.
74	pe4	O	DRUM DA	DRUM D/A output.
75	pe3	O	CTL REC	REC control signal output.
76	pe2	O	CTL STEP	Pulse output during capstan step moving.
77	pe1	I	R/B	Ready and Busy signal.
78	pe0	I	REC SAF	Detection of safety tub of tape.
79	si1	O	PDC CONT	Not used.
80	so1	O	EXP SO	Serial data output for EEPROM.

Pin. No.	Port	I/O	Name	Function
81	sck1	I	EXP CLK	Serial clock output for EEPROM.
82	pi4	O	E TAPE	"H" when high RF level tape.
83	pi3	O	BG/DK	TUNER system detect mode.
84	pi2/ pwm	O	AV CONT	Not used.
85	pi1/rmc	I	RMC	SIRCS signal input.
86	tex	O	TEX	Clock signal input. 32.768 kHz
87	tx	I	TX	Clock signal input. 32.768 kHz
88	vss	I	VSS	GND
89	vdd	I	VDD	VDD
90	n.c.			VDD
91	pa7	O	CW	Way of CAM motor rotation output. "H" is pos, "L" is neg.
92	pa6	O	CAM	CAM motor active signal.
93	pa5	O	POWER ON	"H" during POWERED.
94	pa4	O	NA PB	Normal audio playback signal.
95	pa3	O	A MUTE	Audio mute signal.
96	pa2	O	PAL 60	NTSC PB control signal. "H" when NTSC PB on PAL TV.
97	pa1	O	SYS RESET	System reset signal.
98	pa0	O	LCD CS	LCD chip select signal.
99	pb7	O	TV/VTR	TV/VTR control signal.
100	pb6/ppo14	O	V PB	Video playback control signal. "L" when Video PB mode.

6-8. LCD DRIVER PIN FUNCTION (MA-212 BOARD IC201)

Pin. No.	Port	I/O	Name	Function
1	RESET	I	RESET	When L level, IC is reset mode.
2	T0	O	T0	Output signal for front display (grid).
3	T1	O	T1	Output signal for front display (grid).
4	T2	O	T2	Output signal for front display (grid).
5	T3	O	T3	Output signal for front display (grid).
6	T4	O	T4	Output signal for front display (grid).
7	T5	O	T5	Output signal for front display (grid).
8	T6	O	T6	Output signal for front display (grid).
9	T7	O	N.C.	Open.
10	T8	O	N.C.	Open.
11	T9	O	N.C.	Open.
12	T10/S15/PH3	O	S15	Output signal for front display (anode).
13	T11/S14/PH2	O	S14	Output signal for front display (anode).
14	T12/S13/PH1	O	S13	Output signal for front display (anode).
15	T13/S12/PH0	O	S12	Output signal for front display (anode).
16	T14/S11	O	S11	Output signal for front display (anode).
17	T15	O	S10	Output signal for front display (anode).
18	V LOAD	I	V LOAD	– 30 V input.
19	V PRE	I	V PRE	
20	S9	O	S9	Output signal for front display (anode).
21	S8	O	S8	Output signal for front display (anode).
22	S7	O	S7	Output signal for front display (anode).
23	S6	O	S6	Output signal for front display (anode).
24	S5	O	S5	Output signal for front display (anode).
25	S4	O	S4	Output signal for front display (anode).

Pin. No.	Port	I/O	Name	Function
26	VDD	–	VDD	5 V input.
27	S3	O	S3	Output signal for front display (anode).
28	S2	O	S2	Output signal for front display (anode).
29	S1	O	S1	Output signal for front display (anode).
30	S0	O	S0	Output signal for front display (anode).
31	P00/INT4	I	INT4	GND
32	P01/SCK	I	SCK	Serial clock signal.
33	P02/SO	O	CBC → SI	Serial data output for ASURA.
34	P03/ SCK	I	CBC ← SO	Serial data input from ASURA.
35	P10/INT0	I	INT0	GND
36	P11/INT1	I	CBC CS	Not used.
37	P12/INT2	I	INT2	GND
38	P13/T10	I	T10	GND
39	P20	O	P20	Output signal for POWER LED.
40	P21	O	P21	N.C.
41	P22	O	P22	N.C.
42	P23	O	P23	N.C.
43	P30	O	P30	N.C.
44	P31	O	P31	N.C.
45	P32	O	P32	N.C.
46	P33	O	P33	N.C.
47	P60	O	KEY OUT 0	Output signal for function KEY.
48	P61	O	KEY OUT 1	Output signal for function KEY.
49	P62	O	KEY OUT 2	Output signal for function KEY.
50	P63	O	KEY OUT 3	Output signal for function KEY.
51	P40	I	KEY IN 0	Input signal for function KEY.
52	P41	I	KEY IN 1	Input signal for function KEY.
53	P42	I	KEY IN 2	Input signal for function KEY.
54	P43	I	KEY IN 3	Input signal for function KEY.
55	PPO	O	N.C.	Open.
56	X1	–	X1	Main system clock signal 4.19 MHz.
57	X2	–	X2	Main system clock signal 4.19 MHz.
58	GND	–	GND	GND
59	XT1	–	N.C.	Open.
60	XT2	–	N.C.	Open.
61	P50	I	KEY IN 4	Input signal for function KEY.
62	P51	I	KEY IN 5	Input signal for function KEY.
63	P52	I	KEY IN 6	Input signal for function KEY.
64	P53	I	KEY IN 7	Input signal for function KEY.

SECTION 7
ADJUSTMENTS

During the adjustment, see the Parts Arrangement Diagram for adjustments on Page 7-4.

7-1. MECHANICAL ADJUSTMENTS

Refer to the SERVICE MANUAL of VHS MECHANICAL ADJUSTMENT Ⅳ. (9-973-623-11)

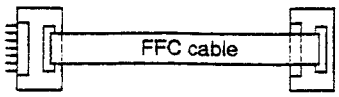
7-2. ELECTRICAL ADJUSTMENTS

2-1. PRE-ADJUSTMENT PREPARATIONS

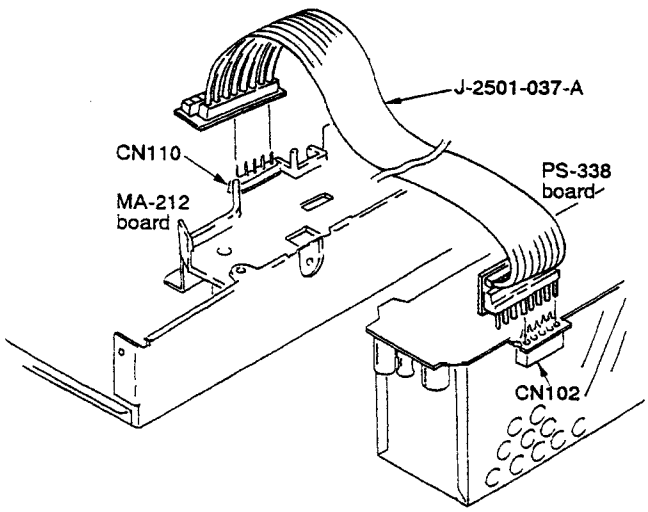
Necessary items and indications for total adjustment of electric circuit of this machine will be described in this chapter.

2-1-1. Instruments to be Used

1) Color TV
2) Oscilloscope 1 or 2 phenomena, band more than 30 MHz, delay mode, as provided.
3) Frequency counter (8 digits or more)
4) PAL, SECAM pattern generators
5) Digital voltmeter
6) Audio level meter
7) Audio generator
8) Attenuator
9) Alignment tape
   Part Code: H7099052H (MH-2)
10) Extension cable



PS-338 (CN102) ↔ MA-212 (CN110)
(J-2501-037-A)



2-1-2. Connection

Unless otherwise specified, connect and adjust the measuring instruments as shown in the following diagram.

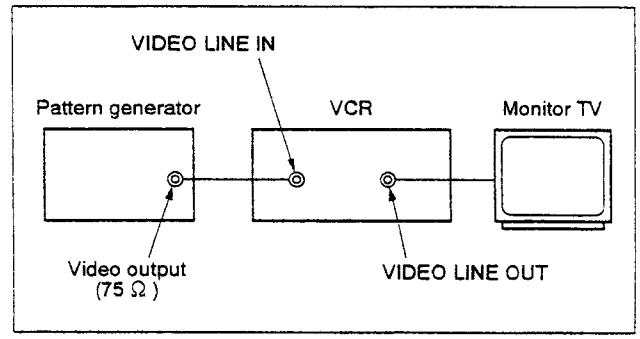


Fig. 7-2-1

2-1-3. Set-up Adjustment

In this adjustment, PAL pattern generator is connected to LINE 1 input signal terminal. Check that the amplitudes of video signal SYNC signal, of picture portions, and of burst signals are flat at approximately 0.3, 0.7 and 0.3 V, respectively, and that the level ratio of the burst sigal and "red" signal is 0.30 : 0.66. Fig. 7-2-2 shows video signals (color bars) used in adjusting the video section.

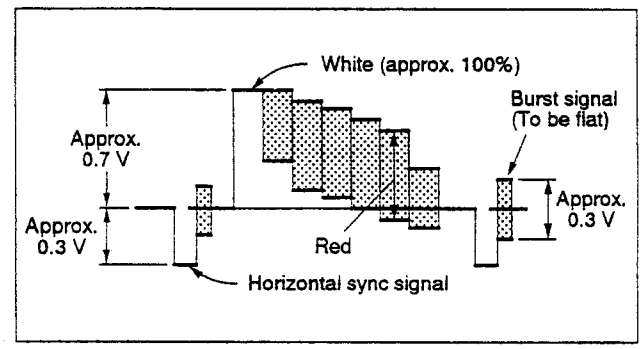


Fig. 7-2-2

2-1-4. Alignment Tape (MH-2)

	Time	Video signal	Audio signal
1	10 minutes	Stair-step	6 kHz
2	5 minutes	—	3 kHz
3	10 minutes	Color bar	1 kHz
4	3 minutes	RF sweep	—

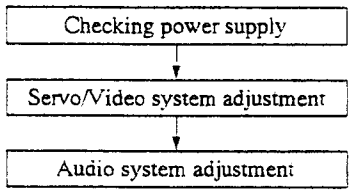
2-1-5. Specified I/O Level and Impedance

Input/output terminal

Video inputs	LINE IN : phono jack
	1 Vp-p, 75 Ω , unbalanced, sync negative
Audio inputs	LINE IN : phono jacks
	47 kΩ , − 7.5 dBs (0 dBs = 0.775 Vrms)
	More than 10 kΩ , − 4 dBs
Video outputs	LINE OUT : phono jack
	1 Vp-p, 75 Ω , unbalanced, sync negative
Audio outputs	LINE OUT : phono jacks
	− 7.5 dBs at load impedance 47 kΩ
	Output impedance : less than 10 kΩ

2-1-6. Adjusting Sequence

Make the electrical adjustment in the following sequence.



2-2. POWER SUPPLY CHECK (MA-212 BOARD)

Mode	E-E
Measuring Instrument	Digital voltmeter
SW 12 V check	
Measurement Point	Pin ② of IC121
Specified Value	12.0 ± 0.3 Vdc
MTR 12 V check	
Measurement Point	Cathode of D121
Specified Value	12.4 ± 0.5 Vdc
SW 5 V check	
Measurement Point	Emitter of Q123
Specified Value	5.0 ± 0.2 Vdc
D5 V check	
Measurement Point	Cathode of D502
Specified Value	5.1 ± 0.2 V
+38 V check	
Measurement Point	Pin ⑥ of CP181
Specified Value	38.0 ± 2.5 Vdc
− 29 V check	
Measurement Point	Pin ⑨ of CP181
Specified Value	− 29.0 ± 3.5 Vdc

Checking Method:

1) Confirm that each voltage meets its specified value.

2-3. SERVO/VIDEO SYSTEM ADJUSTMENTS

2-3-1. Switching Position Adjustment (MA-212 Board)

Purpose:

Adjust the interval between A ch and B ch of tape playback output. Improve the interchangeability with other tapes and sets.
If it is out of order, noise may appear on the playback picture (top or bottom).

Mode	PB
Signal	Alignment tape
Measurement Point	CH1: CNJ001 VIDEO LINE OUT CH2: Pin③ of CN802 (VI-134 board) (RF SWP)
Measuring Instrument	Oscilloscope
Adjusting Element	RV502
Specified Value	6.5 ± 0.5 H (416 ± 32 μsec)

Adjusting Method:

1) Adjust the tracking position to the center by pushing tracking buttons ▲, ▼ (on remote commander).
2) Check that switching position is 6.5 ± 0.5 H. (416 ± 32 μsec)
   If not meet the specified value, turn RV502 and repeat steps 1) to 2).

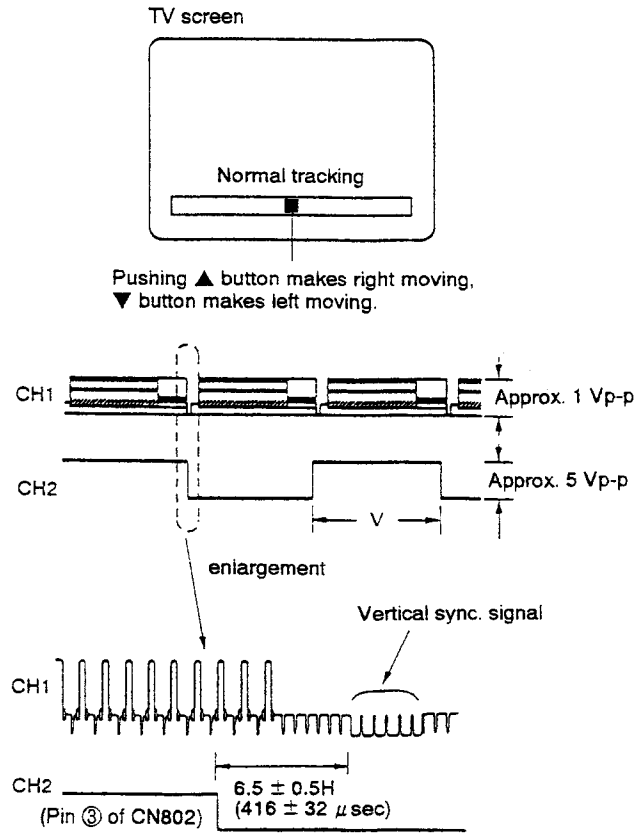


Fig. 7-2-3

2-3-2. SECAM Discrimination Adjustment (VI-134 Board)

Mode	E-E
Signal	SECAM Color bar
Measurement Point	Pin ⑪ of IC001
Measuring Instrument	oscilloscope
Adjusting Element	RV001
Specified Value	4.8 ± 0.1 Vp-p

Adjusting Method:

1) Adjust RV001 so that the amplitude of 1/2 fh waveform becomes 4.8 ± 0.1 Vp-p.

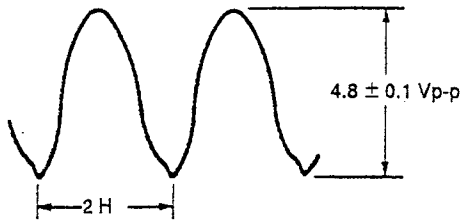


Fig. 7-2-4

2-3-3. VCO Frequency Adjustment (MA-212 Board)

Purpose:

Adjust to set the character position on the screen.

Mode	E-E
Signal	Color bar
Measurement Point	Pin ㉖ of IC601
Measuring Instrument	Oscilloscope (DC mode)
Adjusting Element	CT601
Specified Value	+2.45 ± 0.05 V

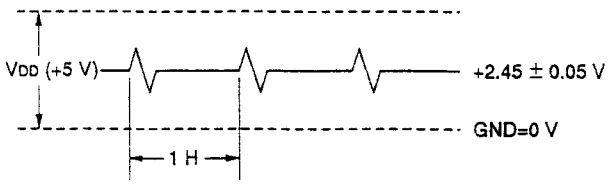


Fig. 7-2-5

2-4. AUDIO SYSTEM ADJUSTMENTS

[Connection]

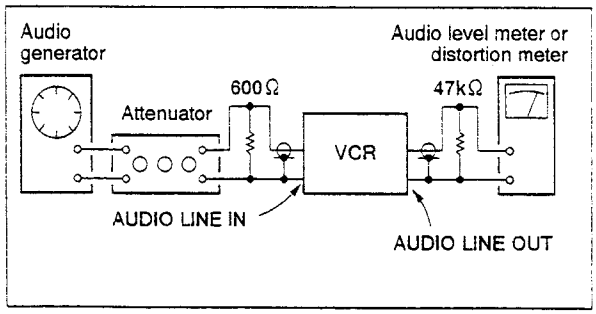


Fig. 7-2-6

2-4-1. Normal Audio System Adjustments

- Make adjustment in the SP mode, unless otherwise specified. Use a normal VHS cassette for an adjustment tape.

1. ACE Head Adjustment

Refer to the service manual of VHS MECHANICAL ADJUSTMENT Ⅳ.

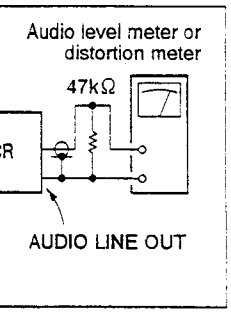
2. Recording Bias Adjustment (MA-212 Board)

Mode	REC and PB
Signal	400 Hz, − 27.5 dBs 7 kHz, − 27.5 dBs
Measurement Point	AUDIO LINE OUT L or R
Measuring Instrument	Audio level meter
Adjusting Element	RV301
Specified Value	0 ± 2 dB

Adjusting Method:

1) Supply a signal of 400 Hz, − 27.5 dBs to Audio Line Input.
2) Connect the audio level meter to the Audio Line Output.
3) Adjust the attenuator so that the audio level meter will indicate − 27.5 dBs.
4) Make recording in the SP mode.
5) Set an audio line input signal to 7 kHz and make recording.
6) Playback a recorded portion, and measure output levels at 400 Hz and 7 kHz.
7) Confirm that the 7 kHz playback output levels within a range of the 400 Hz playback output level 0 ± 2 dB. If it is out of this range, adjust RV301 and repeat the steps 1) through 7) above.

TMENTS



ustments
nless otherwise specified.
ustment tape.

VHS MECHANICAL

A-212 Board)

nd PB
, – 27.5 dBs – 27.5 dBs
) LINE OUT L or R
level meter
dB

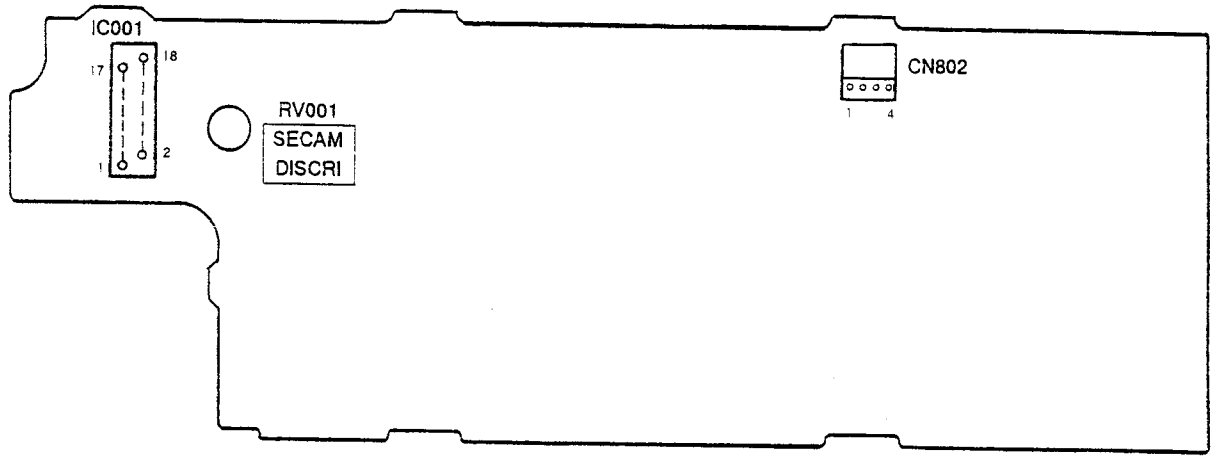
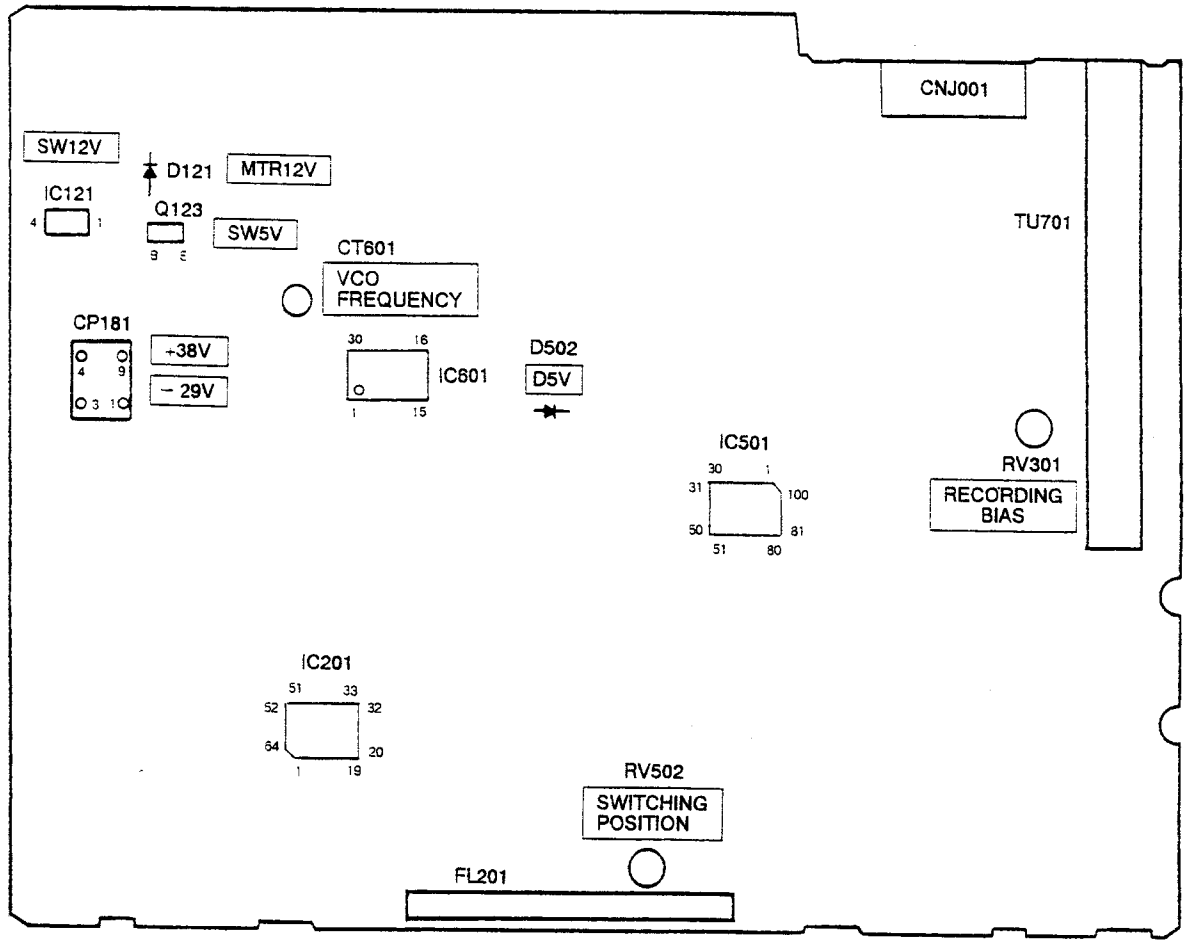
Bs to Audio Line Input.
Audio Line Output.
audio level meter will

Hz and make recording.
easure output levels at 400

tput levels within a range
1 0 ± 2 dB. If it is out of
at the steps 1) through 7)

2-5. PARTS ARRANGEMENT DIAGRAM FOR ADJUSTMENTS

VI-134 (CONDUCTOR SIDE)



MA-212 BOARD (CONDUCTOR SIDE)